AURORA
10/10/66

[illegible]

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                                                                        473423          11.10.66              1
    * 1800A JOB 55-238-00 NANSTONE,                                                     TIME:     11:25.7

     3103  11 10 66                                                     ¢¢¢¢¢¢¢¢

     3104  11 10 66                                                     ¢¢¢¢¢¢¢¢

    *       YJL NANSTONE

  473423A YJL SYSTEM FOR BLK2: REVISION 12 OF PROGRAM AURORA BY DAP GROUP               NOV 10, 1966
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L       ASSEMBLY AND OPERATION INFORMATION                                    USER'S OWN PAGE NO.   1

R0001   VERB INFORMATION.


R0002    REGULAR VERBS
R0003   01  DISPLAY OCTAL COMP 1 (R1)
R0004   02  DISPLAY OCTAL COMP 2 (R1)
R0005   03  DISPLAY OCTAL COMP 3 (R1)
R0006   04  DISPLAY OCTAL COMP 1,2 (R1,R2)
R0007   05  DISPLAY OCTAL COMP 1,2,3 (R1,R2,R3)
R0008   06  DECIMAL DISPLAY
R0009   07  DP DECIMAL DISPLAY (R1,R2)
R0010   10  SPARE
R0011   11  MONITOR OCT COMP 1 (R1)
R0012   12  MONITOR OCT COMP 2 (R1)
R0013   13  MONITOR OCT COMP 3 (R1)
R0014   14  MONITOR OCT COMP 1,2 (R1)
R0015   15  MONITOR OCT COMP 1,2,3 (R1,R2,R3)
R0016   16  MONITOR DECIMAL
R0017   17  MONITOR DP DECIMAL (R1,R2)
R0018   20  SPARE
R0019   21  LOAD COMP 1 (R1)
R0020   22  LOAD COMP 2 (R2)
R0021   23  LOAD COMP 3 (R3)
R0022   24  LOAD COMP 1,2 (R1,R2)
R0023   25  LOAD COMP 1,2,3 (R1,R2,R3)
R0024   26  SPARE
R0025   27  FIXED MEMORY DISPLAY
R0026   30  REQUEST EXECUTIVE
R0027   31  REQUEST WAITLIST
R0028   32  C(R2) INTO R3, C(R1) INTO R2
R0029   33  PROCEED WITHOUT DATA
R0030   34  TERMINATE CURRENT TEST OR LOAD REQUEST
R0031   35  TEST LIGHTS
R0032   36  FRESH START
R0033   37  CHANGE MAJOR MODE
R0034   END OF REGULAR VERBS


R0035   EXTENDED VERBS
R0036   40  ZERO (USED WITH NOUNS 20, 40, AND 70)
R0037   41  COARSE ALIGN (USED WITH NOUNS 20, 40, AND 70)
R0038   42  FINE ALIGN IMU
R0039   43  LOAD IMU ATTITUDE ERROR METERS
R0040   44  ILLEGAL VERB
R0041   45  COMMAND LR TO POSITION 2
R0042   46  SAMPLE RADAR ONCE PER SECOND
R0043   47  PERFORM LEM FCS TEST
R0044   50  PLEASE PERFORM
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R0045    51  PLEASE MARK
R0046    52  PLEASE MARK Y
R0047    53  PLEASE MARK X OR Y
R0048    54  PULSE TORQUE GYROS
R0049    55  ALIGN TIME
R0050    56  PERFORM BANKSUM
R0051    57  PERFORM SYSTEM TEST
R0052    60  ILLEGAL VERB
R0053    61  ILLEGAL VERB
R0054    62  SCAN LEM INBITS
R0055    63  INITIALIZE AGS
R0056    64  ILLEGAL VERB
R0057    65  ILLEGAL VERB
R0058    66  ILLEGAL VERB
R0059    67  ILLEGAL VERB
R0060    70  ILLEGAL VERB
R0061    71  ILLEGAL VERB
R0062    72  ILLEGAL VERB
R0063    73       RHC USED FOR MINIMUM IMPULSE
R0064    74       RHC USED FOR RATE COMMAND
R0065    75       DIGITAL AUTOPILOT WIDE DEADBAND
R0066    76       DIGITAL AUTOPILOT NARROW DEADBAND
R0067    77  ILLEGAL VERB
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L        ASSEMBLY AND OPERATION INFORMATION                                  USER'S OWN PAGE NO.   3

P0068    NORMAL NOUNS                                              SCALE AND DECIMAL POINT
R0070    00  NOT IN USE
R0071    01  SPECIFY MACHINE ADDRESS (FRACTIONAL)                  (.XXXXX)
R0072    02  SPECIFY MACHINE ADDRESS (WHOLE)                       (XXXXX.)
R0073    03  SPECIFY MACHINE ADDRESS (DEGREES)                     (XXX.XXDEGREES)
R0074    04  SPECIFY MACHINE ADDRESS (HOURS)                       (XXX.XXHOURS)
R0075    05  SPECIFY MACHINE ADDRESS (SECONDS)                     (XXX.XXSECONDS)
R0076    06  SPECIFY MACHINE ADDRESS (GYRO DEGREES)                (XX.XXXDEGREES)
R0077    07  SPARE
R0078    10  CHANNEL TO BE SPECIFIED
R0079    11  SPARE
R0080    12  SPARE
R0081    13  SPARE
R0082    14  SPARE
R0083    15  INCREMENT MACHINE ADDRESS                             (OCTAL ONLY)
R0084    16  TIME SECONDS                                          (XXX.XXSECONDS)
R0085    17  TIME HOURS                                            (XXX.XXHOURS)
R0086    20  ICDU                                                  (XXX.XXDEGREES)
R0087    21  PIPAS                                                 (XXXXX.PULSES)
R0088    22  NEW ANGLES I                                          (XXX.XXDEGREES)
R0089    23  DELTA ANGLES I                                        (XXX.XXDEGREES)
R0090    24  DELTA TIME (SECONDS)                                  (XXX.XXSECONDS)
R0091    25  CHECKLIST                                             (XXXXX.)
R0092    26  PRIO/DELAY, ADRES, BBCON                              (OCTAL ONLY)
R0093    27  SELF TEST ON/OFF SWITCH                               (XXXXX.)
R0094    30  STAR NUMBERS                                          (XXXXX.)
R0095    31  FAILREG, SFAIL, ERCOUNT                               (OCTAL ONLY)
R0096    32  DECISION TIME (MIDCOURSE)                             (XXX.XXHOURS (INTERNAL UNITS = WEEKS))
R0098    33  EPHEMERIS TIME (MIDCOURSE)                            (XXX.XXHOURS (INTERNAL UNITS = WEEKS))
R0100    34  MEASURED QUANTITY (MIDCOURSE)                         (XXXX.XKILOMETERS)
R0101    35  INBIT MESSAGE                                         (OCTAL ONLY)
R0102    36  LANDMARK DATA 1                                       (OCTAL ONLY)
R0103    37  LANDMARK DATA 2                                       (OCTAL ONLY)
R0104    40  RENDEZVOUS RADAR ANGLES (TRUNION,SHAFT)               (XXX.XXDEGREES)
R0105    41  NEW RENDEZVOUS RADAR ANGLES (TRUNION,SHAFT)           (XXX.XXDEGREES)
R0106    42  AOT ROTATION ANGLES                                   (XXX.XXDEGREES)
R0107    43  AOT DETENT CODE                                       (XXXXX.)
R0108    44  FORWARD VELOCITY, LATERAL VELOCITY                    (XXXXX.FEET/SEC)
R0109    45  ROTATIONAL HAND CONTROLLER ANGLE RATES                (XXXXX.DEG/SEC)
R0110    46  SPARE
R0111    47  SPARE
R0112    50  SPARE
R0113    51  SPARE
R0114    52  GYRO BIAS DRIFT                                       (.BBXXXXXMILLIRAD/SEC)
R0116    53  GYRO INPUT AXIS ACCELERATION DRIFT                    (.BBXXXXX(MILLIRAD/SEC)/(CM/SEC SEC))
R0118    54  GYRO SPIN AXIS ACCELERATION DRIFT                     (.BBXXXXX(MILLIRAD/SEC)/(CM/SEC SEC))
R0120    END OF NORMAL NOUNS
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L          ASSEMBLY AND OPERATION INFORMATION                                     USER'S OWN PAGE NO.   4

R0121      MIXED NOUNS                                            SCALE AND DECIMAL POINT
R0123      55  LANDING RADAR ALTITUDE, TIME (SECONDS)             (XXXXX.FEET, XXX.XXSEC)
R0125      56  LANDING RADAR VELX, TIME (SECONDS)                 (XXXXX.FEET/SEC, XXX.XXSEC)
R0127      57  LANDING RADAR VELY, TIME (SECONDS)                 (XXXXX.FEET/SEC, XXX.XXSEC)
R0129      60  LANDING RADAR VELZ, TIME (SECONDS)                 (XXXXX.FEET/SEC, XXX.XXSEC)
R0131      61  TARGET AZIMUTH AND ELEVATION                       (XXX.XXDEG, XX.XXXDEG)
R0133      62  RENDEZVOUS RADAR RANGE, TRUNION, SHAFT             (XXXXXB.FEET, XXX.XXDEG, XXX.XXDEG)
R0135      63  RENDEZVOUS RADAR RANGE RATE, TRUNION, SHAFT        (XXXXX.FEET/SEC, XXX.XXDEG, XXX.XXDEG)
R0137      64  INITIAL ALTITUDE, FINAL ALTITUDE, ALT. RATE        (XXXXX.FEET, XXXXX.FEET, XXXXX.FEET/SEC)
R0139      65  SAMPLED TIME (HOURS AND SECONDS)                   (XXX.XXHOURS, XXX.XXSEC)
R0141              (FETCHED IN INTERRUPT)
R0142      66  SYSTEM TEST RESULTS                                (XXXXX., .XXXXX, XXXXX.)
R0144      67  DELTA GYRO ANGLES                                  (XX.XXXDEG  FOR EACH)
R0145      70  OPTICAL TRACKER ANGLES (AZIMUTH, ELEVATION)         (XXX.XXDEG, XXX.XXDEG)
R0147      71  DESIRED OPTICAL TRACKER ANGLES (AZ, ELEV)           (XXX.XXDEG, XXX.XXDEG)
R0149      72  DELTA POSITION                                     (XXXX.XKILOMETERS  FOR EACH)
R0151      73  DELTA VELOCITY                                     (XXXX.XMETERS/SEC  FOR EACH)
R0153      74  MEASUREMENT DATA (MIDCOURSE)                       (XXX.XXHOURS (INTERNAL UNITS=WEEKS), XXXX.XKILOMETERS, XXXXX.
R0155      75  MEASUREMENT DEVIATIONS (MIDCOURSE)                 (XXXX.XKILOMETERS, XXXX.XMETERS/SEC, XXXX.XKILOMETERS)
R0157      76  POSITION VECTOR                                    (XXXX.XKILOMETERS  FOR EACH)
R0159      77  VELOCITY VECTOR                                    (XXXX.XMETERS/SEC  FOR EACH)
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L        ASSEMBLY AND OPERATION INFORMATION                         USER'S OWN PAGE NO.   5

P0161    TABLE OF ERROR CODES



R0162    OPTICS SUB-SYSTEM

R0163    00105    MARK BUTTONS NOT AVAILABLE
R0164    00111    MARK IS MISSING AFTER ENTER
R0165    00112    MARK NOT BEING ACCEPTED
R0166    00113    NO INBITS
R0167    00114    MARK MADE BUT NOT DESIRED
R0168    00115    X MARK NOT MADE

R0169    IMU SUB-SYSTEM

R0170    00207    ISS TURN-ON REQUEST NOT PRESENT FOR 90 SEC.
R0171    00210    IMU NOT OPERATING
R0172    00211    COARSE ALIGN ERROR
R0173    00212    PIPA FAIL BUT PIPA IS NOT BEING USED
R0174    00213    IMU NOT OPERATING WITH TURN-ON REQUEST
R0175    00214    PROGRAM USING IMU WHEN TURNED OFF

R0193    PROCEDURAL DIFFICULTY

R0194    00401    DESIRED GIMBAL ANGLES YIELD GIMBAL LOCK
R0195    00402    STAR OUT OF FIELD OF VIEW
R0196    00403    STAR OUT OF FIELD OF VIEW

R0197    RADAR ERRORS

R0198    00501    RADAR ANTENNA OUT OF LIMITS
R0199    00502    BAD RADAR GIMBAL ANGLE INPUTS
R0200    00503    RADAR ANTENNA DESIGNATE FAIL
R0201    00510    RADAR AUTO DESCRETE NOT PRESENT
R0202    00514    RADAR GOES OUT OF AUTO MODE WHILE BEING USED
R0203    00520    NO RADAR RUPT EXPECTED
R0204    00521    RADAR DATA COULD NOT BE READ
R0205    00522    WRONG LR POSITION
R0206    00523    LR ANTENNA DID NOT MAKE IT
R0207    00524    BAD RADAR TARGET

R0208    COMPUTER HARDWARE MALFUNCTIONS

R0209    01102    AGC SELF TEST ERROR
R0210    01103    UNUSED CCS BRANCH EXECUTED . ABORT
R0211    01105    DOWNLINK TOO FAST
R0212    01106    UPLINK TOO FAST

R0213    LIST OVERFLOWS ( ALL ABORTS )
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L        ASSEMBLY AND OPERATION INFORMATION                                  USER'S OWN PAGE NO.   6

R0214    01201     EXECUTIVE OVERFLOW-NO VAC AREAS
R0215    01202     EXECUTIVE OVERFLOW-NO CORE SETS
R0216    01203     WAITLIST OVERFLOW-TOO MANY TASKS
R0217    01206     KEYBOARD AND DISPLAY WAITING LINE OVERFLOW
R0218    01207     NO VAC AREA FOR MARKS
R0219    01210     TWO PROGRAMS USING DEVICE AT SAME TIME

R0220    INTERPRETER ERRORS

R0221    01301     ARCSIN-ARCCOS INPUT ANGLE TOO LARGE. ABORT
R0222    01302     SQRT CALLED WITH NEGATIVE ARGUMENT . ABORT

R0223    DISPLAY ALARMS

R0224    01400     PITCH AND/OR ROLL TRIM FAIL IS ON (SHOWN WITH V50N25).
R0225    01410     TEMPORARY JET FAIL
R0226    01411     CDU DOES NOT AGREE WITH COMMAND TO 1 DEGREE

R0227    KEYBOARD AND DISPLAY PROGRAM

R0228    01501     KEYBOARD AND DISPLAY ALARM DURING INTERNAL USE(NVSUB).ABORT
R0229    SYSTEM TEST ALARMS

R0230    01600     DRIFT TEST OVERFLOW ALARM
R0231    01601     SOME ERROR IN GYRO TORQUING DURING DRIFT TEST OR COMPASSS
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L        ERASABLE ASSIGNMENTS                                                    USER'S OWN PAGE NO.   1

 0001                                      0000  A        EQUALS 0
 0002                                      0001  L        EQUALS 1                L AND Q ARE BOTH CHANNELS AND REGISTERS.
 0003                                      0002  Q        EQUALS 2
 0004                                      0003  EBANK    EQUALS 3
 0005                                      0004  FBANK    EQUALS 4
 0006                                      0005  Z        EQUALS 5                ADJACENT TO FBANK AND BBANK FOR DXCH Z
 0007                                      0006  BBANK    EQUALS 6                (DTCB) AND DXCH FBANK (DTCF).
A0008                                                                             REGISTER 7 IS A ZERO-SOURCE, USED BY ZL.

 0009                                      0010  ARUPT    EQUALS 10               INTERRUPT STORAGE.
 0010                                      0011  LRUPT    EQUALS 11
 0011                                      0012  QRUPT    EQUALS 12
 0012                                      0013  SAMPTIME EQUALS 13               SAMPLED TIME 1 & 2.
 0013                                      0015  ZRUPT    EQUALS 15               (13 AND 14 ARE SPARES.)
 0014                                      0016  BANKRUPT EQUALS 16               USUALLY HOLDS FBANK OR BBANK.
 0015                                      0017  BRUPT    EQUALS 17               RESUME ADDRESS AS WELL.

 0016                                      0020  CYR      EQUALS 20
 0017                                      0021  SR       EQUALS 21
 0018                                      0022  CYL      EQUALS 22
 0019                                      0023  EDOP     EQUALS 23               EDITS INTERPRETIVE OPERATION CODE PAIRS.


 0020                                      0024  TIME2    EQUALS 24
 0021                                      0025  TIME1    EQUALS 25
 0022                                      0026  TIME3    EQUALS 26
 0023                                      0027  TIME4    EQUALS 27
 0024                                      0030  TIME5    EQUALS 30
 0025                                      0031  TIME6    EQUALS 31
 0026                                      0032  CDUX     EQUALS 32
 0027                                      0033  CDUY     EQUALS 33
 0028                                      0034  CDUZ     EQUALS 34
 0029                                      0035  OPTY     EQUALS 35
 0030                                      0036  OPTX     EQUALS 36
 0031                                      0037  PIPAX    EQUALS 37
 0032                                      0040  PIPAY    EQUALS 40
 0033                                      0041  PIPAZ    EQUALS 41
 0034                                      0042  BMAGX    EQUALS 42
 0035                                      0042  RHCP     EQUALS 42
 0036                                      0043  BMAGY    EQUALS 43
 0037                                      0043  RHCY     EQUALS 43
 0038                                      0044  BMAGZ    EQUALS 44
 0039                                      0044  RHCR     EQUALS 44
 0040                                      0045  INLINK   EQUALS 45
 0041                                      0046  RNRAD    EQUALS 46
 0042                                      0047  GYROCTR  EQUALS 47
 0043                                      0047  GYROCMD  EQUALS 47
 0044                                      0050  CDUXCMD  EQUALS 50
 0045                                      0051  CDUYCMD  EQUALS 51
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L        ERASABLE ASSIGNMENTS                                                   USER'S OWN PAGE NO.   2

 0046                                 0052  CDUZCMD   EQUALS 52
 0047                                 0053  OPTYCMD   EQUALS 53
 0048                                 0054  OPTXCMD   EQUALS 54
 0049                                 0055  EMSD      EQUALS 55
 0050                                 0055  THRUST    EQUALS 55
 0051                                 0056  LEMONM    EQUALS 56
 0052                                 0057  OUTLINK   EQUALS 57
 0053                                 0060  ALTM      EQUALS 60

 0054                                 0067            SETLOC 67             DECODED REGISTER FOR NIGHT-WATCHMAN ALM.
 0055                          0067   0067  NEWJOB    ERASE

 0056                                 0042  LVSQUARE  EQUALS 34D            SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
 0057                                 0044  LV        EQUALS 36D            LENGTH OF VECTOR INPUT TO UNIT.
 0058                                 0046  X1        EQUALS 38D            INTERPRETIVE SPECIAL REGISTERS RELATIVE
 0059                                 0047  X2        EQUALS 39D            TO THE WORK AREA.
 0060                                 0050  S1        EQUALS 40D
 0061                                 0051  S2        EQUALS 41D
 0062                                 0052  QPRET     EQUALS 42D
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L        ERASABLE ASSIGNMENTS                                                          USER'S OWN PAGE NO.   3

P0063    GENERAL ERASABLE ASSIGNMENTS.

 0064                                     0061           SETLOC 61

R0065             INTERPRETIVE SWITCH RESERVATIONS.

 0066                              0061   0064  STATE    ERASE  +3                60 SWITCHES PRESENTLY.

R0067             INTERPRETIVE SWITCH BIT ASSIGNMENTS:

 0068                                     0000  WMATFLAG EQUALS 0
 0069                                     0001  JSWITCH  EQUALS 1
 0070                                     0002  MIDFLAG  EQUALS 2
 0071                                     0003  MOONFLAG EQUALS 3
 0072                                     0004  NBSMBIT  EQUALS 4
 0073                                     0005  COAROFIN EQUALS 5
 0074                                     0006  BODYFLAG EQUALS 6
 0075                                     0007  IMUSE    EQUALS 7
 0076                                     0010  RRUSE    EQUALS 8D
 0077                                     0011  RRNBSW   EQUALS 9D
 0078                                     0012  LOKONSW  EQUALS 10D
R0079    END OF SWITCH ASSIGNMENTS


R0080             THE FOLLOWING SET COMPRISES THE INTERRUPT TEMPORARY STORAGE POO

R0081             ANY OF THESE MAY BE USED AS TEMPORARIES DURING INTERRUPT OR WITH INTERRUPT INHIBITED. THE ITEMP SERIES
R0083    IS USED DURING CALLS TO THE EXECUTIVE AND WAITLIST - THE RUPTREGS ARE NOT.

 0085                              0065   0065  ITEMP1   ERASE
 0086    REF    1                         0065  WAITEXIT EQUALS ITEMP1
 0087    REF    2 LAST    9               0065  EXECTEM1 EQUALS ITEMP1

 0088                              0066   0066  ITEMP2   ERASE
 0089    REF    1                         0066  WAITBANK EQUALS ITEMP2
 0090    REF    2 LAST    9               0066  EXECTEM2 EQUALS ITEMP2

 0091                                     0070           SETLOC 70

 0092                              0070   0070  ITEMP3   ERASE
 0093    REF    1                         0070  RUPTSTOR EQUALS ITEMP3
 0094    REF    2 LAST    9               0070  WAITADR  EQUALS ITEMP3
 0095    REF    3 LAST    9               0070  NEWPRIO  EQUALS ITEMP3

 0096                              0071   0071  ITEMP4   ERASE
 0097    REF    1                         0071  LOCCTR   EQUALS ITEMP4
 0098    REF    2 LAST    9               0071  WAITTEMP EQUALS ITEMP4

 0099                              0072   0072  ITEMP5   ERASE
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L     ERASABLE ASSIGNMENTS                                                     USER'S OWN PAGE NO.  4

 0100  REF   1                        0072  NEWLOC    EQUALS ITEMP5

 0101                         0073    0073  ITEMP6    ERASE
A0102                                       NEWLOC+1  EQUALS ITEMP6          DP ADDRESS.

 0103                         0074    0074  RUPTREG1  ERASE
 0104                         0075    0075  RUPTREG2  ERASE
 0105                         0076    0076  RUPTREG3  ERASE
 0106                         0077    0077  RUPTREG4  ERASE
 0107  REF   1                        0077  KEYTEMP1  EQUALS RUPTREG4
 0108  REF   2 LAST  10               0077  DSRUPTEM  EQUALS RUPTREG4

R0109          THE FOLLOWING ARE EXECUTIVE TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOB INQUIRIES.

 0111                         0100    0100  INTB15+   ERASE                  REFLECTS 15TH BIT OF INDEXABLE ADDRESSES
 0112  REF   1                        0100  DSEXIT    =      INTB15+         RETURN FOR DSPIN
 0113  REF   2 LAST  10               0100  EXITEM    =      INTB15+         RETURN FOR SCALE FACTOR ROUTINE SELECT
 0114  REF   3 LAST  10               0100  BLANKRET  =      INTB15+         RETURN FOR 2BLANK

 0115                         0101    0101  INTBIT15  ERASE                  SIMILAR TO ABOVE.
 0116  REF   1                        0101  WRDRET    =      INTBIT15        RETURN FOR 5BLANK
 0117  REF   2 LAST  10               0101  WDRET     =      INTBIT15        RETURN FOR DSPWD
 0118  REF   3 LAST  10               0101  DECRET    =      INTBIT15        RETURN FOR PUTCOM(DEC LOAD)
 0119  REF   4 LAST  10               0101  21/22REG  =      INTBIT15        TEMP FOR CHARIN

R0120          THE REGISTERS BETWEEN ADDRWD AND PRIORITY MUST STAY IN THE FOLLOWING ORDER FOR INTERPRETIVE TRACE.

 0122                         0102    0102  ADDRWD    ERASE                  12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.
 0123                         0103    0103  POLISH    ERASE                  HOLDS CADR MADE FROM POLISH ADDRESS.
 0124  REF   1                        0103  UPDATRET  =      POLISH          RETURN FOR UPDATNN, UPDATVB
 0125  REF   2 LAST  10               0103  CHAR      =      POLISH          TEMP FOR CHARIN
 0126  REF   3 LAST  10               0103  ERCNT     =      POLISH          COUNTER FOR ERROR LIGHT RESET
 0127  REF   4 LAST  10               0103  DECOUNT   =      POLISH          COUNTER FOR SCALING AND DISPLAY (DEC)

 0128                         0104    0104  FIXLOC    ERASE                  WORK AREA ADDRESS.

 0129                         0105    0105  OVFIND    ERASE                  SET NON-ZERO ON OVERFLOW.

 0130                         0106    0113  VBUF      ERASE  +5              TEMPORARY STORAGE USED FOR VECTORS.
 0131  REF   1                        0106  SGNON     =      VBUF            TEMP FOR +,- ON
 0132  REF   2 LAST  10               0106  NOUNTEM   =      VBUF            COUNTER FOR MIXNOUN FETCH
 0133  REF   3 LAST  10               0106  DISTEM    =      VBUF            COUNTER FOR OCTAL DISPLAY VERBS
 0134  REF   4 LAST  10               0106  DECTEM    =      VBUF            COUNTER FOR FETCH (DEC DISPLAY VERBS)

 0135  REF   5 LAST  10               0107  SGNOFF    =      VBUF      +1    TEMP FOR +,- ON
 0136  REF   6 LAST  10               0107  NVTEMP    =      VBUF      +1    TEMP FOR NVSUB
 0137  REF   7 LAST  10               0107  SFTEMP1   =      VBUF      +1    STORAGE FOR SF CONST HI PART(=SFTEMP2-1)

 0138  REF   8 LAST  10               0110  CODE      =      VBUF      +2    FOR DSPIN
 0139  REF   9 LAST  10               0110  SFTEMP2   =      VBUF      +2    STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
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L       ERASABLE ASSIGNMENTS                                                   USER'S OWN PAGE NO.   5

 0140   REF  10 LAST  10                 0111  MIXTEMP   =        VBUF    +3   FOR MIXNOUN DATA
 0141   REF  11 LAST  11                 0111  SIGNRET   =        VBUF    +3   RETURN FOR +,- ON

R0142   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

 0143                          0114      0116  BUF       ERASE   +2            TEMPORARY SCALAR STORAGE.
 0144                          0117      0120  BUF2      ERASE   +1
 0145   REF   1                          0114  INDEXLOC  EQUALS  BUF           CONTAINS ADDRESS OF SPECIFIED INDEX.
 0146   REF   2 LAST  11                 0114  SWWORD    EQUALS  BUF           ADDRESS OF SWITCH WORD.
 0147   REF   3 LAST  11                 0115  SWBIT     EQUALS  BUF  +1       SWITCH BIT WITHIN SWITCH WORD.
 0148                          0121      0121  MPTEMP    ERASE                 TEMPORARY USED IN MULTIPLY AND SHIFT.
 0149                          0122      0122  DOTINC    ERASE                 COMPONENT INCREMENT FOR DOT SUBROUTINE.
 0150   REF   1                          0122  DVSIGN    EQUALS  DOTINC        DETERMINES SIGN OF DDV RESULT.
 0151   REF   2 LAST  11                 0122  ESCAPE    EQUALS  DOTINC        USED IN ARCSIN/ARCCOS.
 0152   REF   3 LAST  11                 0122  ENTRET    =       DOTINC        EXIT FROM ENTER

 0153                          0123      0123  DOTRET    ERASE                 RETURN FROM DOT SUBROUTINE.
 0154   REF   1                          0123  DVNORMCT  EQUALS  DOTRET        DIVIDEND NORMALIZATION COUNT IN DDV.
 0155   REF   2 LAST  11                 0123  ESCAPE2   EQUALS  DOTRET        ALTERNATE ARCSIN/ARCCOS SWITCH.
 0156   REF   3 LAST  11                 0123  WDCNT     =       DOTRET        CHAR COUNTER FOR DSPWD
 0157   REF   4 LAST  11                 0123  INREL     =       DOTRET        INPUT BUFFER SELECTOR ( X,Y,Z, REG )

 0158                          0124      0124  MATINC    ERASE                 VECTOR INCREMENT IN MXV AND VXM.
 0159   REF   1                          0124  MAXDVSW   EQUALS  MATINC        +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
 0160   REF   2 LAST  11                 0124  POLYCNT   EQUALS  MATINC        POLYNOMIAL LOOP COUNTER
 0161   REF   3 LAST  11                 0124  DSPMMTEM  =       MATINC        DSPCOUNT SAVE FOR DSPMM
 0162   REF   4 LAST  11                 0124  MIXBR     =       MATINC        INDICATOR FOR MIXED OR NORMAL NOUN

 0163                          0125      0125  TEM1      ERASE                 EXEC TEMP
 0164   REF   1                          0125  POLYRET   =       TEM1
 0165   REF   2 LAST  11                 0125  DSREL     =       TEM1          REL ADDRESS FOR DSPIN

 0166                          0126      0126  TEM2      ERASE                 EXEC TEMP
 0167   REF   1                          0126  DSMAG     =       TEM2          MAGNITUDE STORE FOR DSPIN
 0168   REF   2 LAST  11                 0126  IDADDTEM  =       TEM2          MIXNOUN INDIRECT ADDRESS STORAGE

 0169                          0127      0127  TEM3      ERASE                 EXEC TEMP
 0170   REF   1                          0127  COUNT     =       TEM3          FOR DSPIN

 0171                          0130      0130  TEM4      ERASE                 EXEC TEMP
 0172   REF   1                          0130  LSTPTR    =       TEM4          LIST POINTER FOR GRABUSY
 0173   REF   2 LAST  11                 0130  RELRET    =       TEM4          RETURN FOR RELDSP
 0174   REF   3 LAST  11                 0130  FREERET   =       TEM4          RETURN FOR FREEDSP

 0175                          0131      0131  TEM5      ERASE                 EXEC TEMP
 0176   REF   1                          0131  NOUNADD   =       TEM5          TEMP STORAGE FOR NOUN ADDRESS

 0177                          0132      0132  NNADTEM   ERASE                 TEMP FOR NOUN ADDRESS TABLE ENTRY
 0178                          0133      0133  NNTYPTEM  ERASE                 TEMP FOR NOUN TYPE TABLE ENTRY
 0179                          0134      0134  IDADITEM  ERASE                 TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
```

```
L       ERASABLE ASSIGNMENTS                                                         USER'S OWN PAGE NO.   6

A0180                                                                               MUST = IDAD2TEM-1, = IDAD3TEM-2.
 0181                          0135       0135  IDAD2TEM ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0182                                                                               MUST = IDAD1TEM+1, = IDAD3TEM-1.
 0183                          0136       0136  IDAD3TEM ERASE                      TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0184                                                                               MUST = IDAD1TEM+2, = IDAD2TEM+1.
 0185                          0137       0137  RUTMXTEM ERASE                      TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)

R0186           STORAGE USED BY THE EXECUTIVE.

 0187                          0140       0146  MPAC     ERASE  +6                  MULTI-PURPOSE ACCUMULATOR.
 0188                          0147       0147  MODE     ERASE                      +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
 0189                          0150       0150  LOC      ERASE                      LOCATION ASSOCIATED WITH JOB.
 0190                          0151       0151  BANKSET  ERASE                      USUALLY CONTAINS BBANK SETTING.
 0191                          0152       0152  PUSHLOC  ERASE                      WORD OF PACKED INTERPRETIVE PARAMETERS.
 0192                          0153       0153  PRIORITY ERASE                      PRIORITY OF PRESENT JOB AND WORK AREA.

 0193                          0154       0263           ERASE  +71D                SEVEN SETS OF 12 REGISTERS EACH.
```

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L        ERASABLE ASSIGNMENTS                                                  USER'S OWN PAGE NO.   7

P0194    THE FOLLOWING REGISTERS ARE RESERVED FOR PINBALL


R0195    RESERVED FOR PINBALL EXECUTIVE ACTION

 0196                     0264      0264  DSPCOUNT ERASE                       DISPLAY POSITION INDICATOR
 0197                     0265      0265  DECBRNCH ERASE                       +DEC, - DEC, OCT INDICATOR
 0198                     0266      0266  VERBREG  ERASE                       VERB CODE
 0199                     0267      0267  NOUNREG  ERASE                       NOUN CODE
 0200                     0270      0270  XREG     ERASE                       R1 INPUT BUFFER
 0201                     0271      0271  YREG     ERASE                       R2 INPUT BUFFER
 0202                     0272      0272  ZREG     ERASE                       R3 INPUT BUFFER
 0203                     0273      0273  XREGLP   ERASE                       LO PART OF XREG (FOR DEC CONV ONLY)
 0204                     0274      0274  YREGLP   ERASE                       LO PART OF YREG (FOR DEC CONV ONLY)
 0205                     0275      0275  ZREGLP   ERASE                       LO PART OF ZREG (FOR DEC CONV ONLY)
 0206                     0276      0276  MODREG   ERASE                       MODE CODE
 0207                     0277      0277  DSPLOCK  ERASE                       KEYBOARD/SUBROUTINE CALL INTERLOCK
 0208                     0300      0300  REQRET   ERASE                       RETURN REGISTER FOR LOAD
 0209                     0301      0301  LOADSTAT ERASE                       STATUS INDICATOR FOR LOADTST
 0210                     0302      0302  CLPASS   ERASE                       PASS INDICATOR CLEAR
 0211                     0303      0303  NOUT     ERASE                       ACTIVITY COUNTER FOR DSPTAB
 0212                     0304      0304  NOUNCADR ERASE                       MACHINE CADR FOR NOUN
 0213                     0305      0305  MONSAVE  ERASE                       N/V CODE FOR MONITOR. (= MONSAVE1-1)
 0214                     0306      0306  MONSAVE1 ERASE                       NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
 0215                     0307      0322  DSPTAB   ERASE  +11D                 0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
 0216                     0323      0323  CADRSTOR ERASE                       ENDIDLE STORAGE
 0217                     0324      0324  GRABLOCK ERASE                       INTERNAL INTERLOCK FOR DISPLAY SYSTEM
 0218                     0325      0325  NVQTEM   ERASE                       NVSUB STORAGE FOR CALLING ADDRESS
A0219                                                                          MUST = NVBNKTEM-1
 0220                     0326      0326  NVBNKTEM ERASE                       NVSUB STORAGE FOR CALLING BANK
A0221                                                                          MUST = NVQTEM+1
 0222                     0327      0331  DSPLIST  ERASE            +2         WAITING LIST FOR DSP SYST INTERNAL USE
 0223                     0332      0332  EXTVBACT ERASE                       EXTENDED VERB ACTIVITY INTERLOCK
 0224                     0333      0335  DSPTEM1  ERASE            +2         BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
 0225                     0336      0340  DSPTEM2  ERASE            +2         BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
R0226    END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0227    RESERVED FOR PINBALL INTERRUPT ACTION

 0228                     0341      0341  DSPCNT   ERASE                       COUNTER FOR DSPOUT
 0229                     0342      0342  UPLOCK   ERASE                       BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0230                                                                          RECEPTION OF A BAD MESSAGE IN UPLINK)
R0231    END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0232            DAP STORAGE IN NON-SWITCHED ERASABLE.
```

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L       ERASABLE ASSIGNMENTS                                                 USER'S OWN PAGE NO.   8

 0233                               0343       0344  T6LOC      ERASE   +1
 0234   REF    1                               0343  T6ADR      EQUALS T6LOC
 0235                               0345       0346  T5LOC      ERASE   +1
 0236   REF    1                               0345  T5ADR      EQUALS T5LOC
```

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L        ERASABLE ASSIGNMENTS                                                         USER'S OWN PAGE NO.   9

P0237    ASSIGNMENTS FOR T4RUPT PROGRAM

 0238                               0347     0347  T4LOC     ERASE
 0239                               0350     0350  DSRUPTSW  ERASE
 0240                               0351     0351  DIDFLG    ERASE
 0241                               0352     0353  ALT       ERASE    +1
 0242                               0354     0354  ALTRATE   ERASE
 0243                               0355     0356  FINALT    ERASE    +1                  (MAY NOT BE REQUIRED FOR FLIGHTS).
 0244                               0357     0357  LGYRO     ERASE
 0245                               0360     0360  FORVEL    ERASE
 0246                               0361     0361  LATVEL    ERASE
 0247                               0362     0362  LASTYCMD  ERASE
 0248                               0363     0363  LASTXCMD  ERASE

 0249                               0364     0365  ALTSAVE   ERASE    +1
 0250                               0366     0366  LMPCMD    ERASE

R0251    END OF T4RUPT ASSIGNMENTS


 0252                               0367     0367  IMODES30  ERASE
 0253                               0370     0370  IMODES33  ERASE
 0254                               0371     0373  MODECADR  ERASE    +2
 0255    REF    1                            0371  IMUCADR   EQUALS MODECADR
 0256    REF    2 LAST  15                   0372  AOTCADR   EQUALS MODECADR +1
 0257    REF    1                            0372  OPTCADR   EQUALS AOTCADR
 0258    REF    3 LAST  15                   0373  RADCADR   EQUALS MODECADR +2

 0259                               0374     0374  MARKSTAT  ERASE
 0260                               0375     0375  XYMARK    ERASE
 0261                                        0400            SETLOC 400
```

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L         ERASABLE ASSIGNMENTS                                                 USER'S OWN PAGE NO.  10

P0262     TEMPORARY PHONY ASSIGNMENTS TO KEEP PINBALL FROM HAVING BAD ASSEMBLIES

 0263                         0400     0402  THETAD   ERASE  +2
 0264                         0403     0410  DELVX    ERASE  +5
R0265     END OF PHONY ASSIGNMENTS



R0266               DOWNLINK LIST ADDRESS.
 0267                         0411     0411  DNLSTADR ERASE

R0268     AGS DUMMY ID WORD
 0269                         0412     0412  AGSWORD  ERASE
R0270     RADAR ERASABLE

 0271                         0413     0413  RADMODES ERASE
 0272                         0414     0414  SAMPLIM  ERASE
 0273                         0415     0416  SAMPLSUM ERASE  +1
 0274     REF   1                      0415  SAMPSUM  EQUALS SAMPLSUM
 0275                         0417     0420  OPTYHOLD ERASE  +1
 0276                         0421     0422  TIMEHOLD ERASE  +1
 0277     REF   2 LAST  16             0415  RRTARGET EQUALS SAMPLSUM        HALF UNIT VECTOR IN SM OR NB AXES.
 0278                         0423     0424  TANG     ERASE  +1              DESIRED TRUNNION AND SHAFT ANGLES.
 0279     REF   1                      0423  MODEA    EQUALS TANG
 0280                         0425     0426  MODEB    ERASE  +1              DODES CLOBBERS TANG +2.
 0281     REF   1                      0425  NSAMP    EQUALS MODEB
 0282                         0427     0427  DESRET   ERASE
 0283     REF   1                      0427  OLDATAGD EQUALS DESRET          USED IN DATA READING ROUTINES.
 0284                         0430     0430  DESCOUNT ERASE
R0285     END OF RADAR ERASABLE ASSIGNMENTS

 0286                         0431     0431  VAC1USE  ERASE
 0287                         0432     0504  VAC1     ERASE  +42D
 0288                         0505     0505  VAC2USE  ERASE
 0289                         0506     0560  VAC2     ERASE  +42D
 0290                         0561     0561  VAC3USE  ERASE
 0291                         0562     0634  VAC3     ERASE  +42D
 0292                         0635     0635  VAC4USE  ERASE
 0293                         0636     0710  VAC4     ERASE  +42D
 0294                         0711     0711  VAC5USE  ERASE
 0295                         0712     0764  VAC5     ERASE  +42D

R02951    UNSWITCHED ERASABLE STORAGE ASSIGNMENTS FOR THE DAP

 02952                        0765     0765  DAPBOOLS ERASE
 02953                        0766     0767  T6NEXT   ERASE  +1
 02954                        0770     0772  T6NEXTJT ERASE  +2

 02955                        0773     0773  DELAYCTR ERASE
R02956    THESE ARE WRITTEN INTO FROM SEVERAL PROGRAMS
```

```
 02957                          0774     0774  CDUXD     ERASE
 02958                          0775     0775  CDUYD     ERASE
 02959                          0776     0776  CDUZD     ERASE
 0296                                    1000            SETLOC 1000

R0297   ERASABLE STORAGE FOR AVERAGE G INTEGRATOR

 0298                           1000     1005  RN        ERASE   +5
 0299                           1006     1013  VN        ERASE   +5
 0300                           1014     1014  NSHIFT    ERASE
 0301                           1015     1015  XSHIFT    ERASE
 0302                           1016     1023  UNITR     ERASE   +5
 0303                           1024     1031  UNITW     ERASE   +5
 0304                           1032     1033  RMAG      ERASE   +1
 0305                           1034     1035  RMAGSQ    ERASE   +1
 0306                           1036     1043  GRAVITY   ERASE   +5
 0307                           1044     1051  DELV      ERASE   +5
 0308                           1052     1053  DELTAT    ERASE   +1
 0309                           1054     1061  RN1       ERASE   +5
 0310                           1062     1067  VN1       ERASE   +5
R0312           WAITLIST REPEAT FLAG:

 0313                           1070     1070  RUPTAGN   ERASE
 0314   REF    1                         1070  KEYTEMP2 =       RUPTAGN          TEMP FOR KEYRUPT, UPRUPT

R0315           PHASE TABLE AND RESTART COUNTER.

 0316                           1071     1071  -PHASE0   ERASE
 0317                           1072     1072  PHASE0    ERASE
 0318                           1073     1073  -PHASE1   ERASE
 0319                           1074     1074  PHASE1    ERASE
 0320                           1075     1075  -PHASE2   ERASE
 0321                           1076     1076  PHASE2    ERASE
 0322                           1077     1077  -PHASE3   ERASE
 0323                           1100     1100  PHASE3    ERASE
 0324                           1101     1101  -PHASE4   ERASE
 0325                           1102     1102  PHASE4    ERASE
 0326                           1103     1103  -PHASE5   ERASE
 0327                           1104     1104  PHASE5    ERASE

R0328   ERASABLE FOR SINGLE PRECISION SUBROUTINES.

 0329                           1105     1105  HALFY     ERASE
 0330                           1106     1106  ROOTRET   ERASE
 0331                           1107     1107  SQRARG    ERASE
 0332   REF    1                         1105  TEMK      EQUALS HALFY
 0333   REF    1                         1106  SQ        EQUALS ROOTRET

 0334                           1110     1110  1/PIPADT ERASE                    IMU COMPENSATION PACKAGE
 0335   REF    1                         1110  OLDBT1    =      1/PIPADT
```

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R0366   ASSIGNMENTS RESERVED EXCLUSIVELY FOR SELF-CHECK
 0367                      1360      1377  SELFERAS ERASE  1360 - 1377

 0368                                1360  SELFRET  =      1360
 0369                                1361  SMODE    =      1361
 0370                                1362  REDOCTR  =      1362                KEEPS TRACK OF RESTARTS
 0371                                1363  FAILREG  =      1363
 0372                                1364  SFAIL    =      1364
 0373                                1365  ERCOUNT  =      1365
 0374                                1366  SCOUNT   =      1366
 0375                                1371  SKEEP1   =      1371
 0376                                1372  SKEEP2   =      1372
 0377                                1373  SKEEP3   =      1373
 0378                                1374  SKEEP4   =      1374
 0379                                1375  SKEEP5   =      1375
 0380                                1376  SKEEP6   =      1376
 0381                                1377  SKEEP7   =      1377

R0382   WAITLIST TASK LISTS

 0383                             E3,1400           SETLOC 1400

 0384                    E3,1400  E3,1407  LST1     ERASE  +7                  DELTA T'S.
 0385                    E3,1410  E3,1431  LST2     ERASE  +17D                2CADR TASK ADDRESSES.

R0386           IMU COMPENSATION PARAMETERS:

 0387                    E3,1432  E3,1432  PBIASX   ERASE                      PIPA BIAS AND PIPA SCALE FACTOR TERMS
 03875  REF    1                  E3,1432  PIPABIAS =      PBIASX                   INTERMIXED.
 0388                    E3,1433  E3,1433  PIPASCFX ERASE
 03885  REF    1                  E3,1433  PIPASCF  =      PIPASCFX
 0389                    E3,1434  E3,1434  PBIASY   ERASE
 0390                    E3,1435  E3,1435  PIPASCFY ERASE
 0391                    E3,1436  E3,1436  PBIASZ   ERASE
 0392                    E3,1437  E3,1437  PIPASCFZ ERASE

 0393                    E3,1440  E3,1440  NBDX     ERASE                      GYRO BIAS DRIFTS
 03931  REF    1                  E3,1440  GBIASX   =      NBDX
 03932                   E3,1441  E3,1441  NBDY     ERASE
 03934                   E3,1442  E3,1442  NBDZ     ERASE

 0394                    E3,1443  E3,1443  ADIAX    ERASE                      ACCELERATION SENSITIVE DRIFT ALONG THE
 03942                   E3,1444  E3,1444  ADIAY    ERASE                           INPUT AXIS
 03944                   E3,1445  E3,1445  ADIAZ    ERASE

 0395                    E3,1446  E3,1446  ADSRAX   ERASE                      ACCELERATION SENSITIVE DRIFT ALONG THE
 03952                   E3,1447  E3,1447  ADSRAY   ERASE                           SPIN REFERENCE AXIS
 03954                   E3,1450  E3,1450  ADSRAZ   ERASE

 0396                    E3,1451  E3,1456  GCOMP    ERASE  +5                  CONTAINS COMPENSATING TORQUES
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L        ERASABLE ASSIGNMENTS                                                                      USER'S OWN PAGE NO.  13

 03965                        E3,1457   E3,1457  GCOMPSW   ERASE
 0397    REF    1                       E3,1451  COMMAND   EQUALS GCOMP
 0398    REF    2 LAST   19             E3,1454  CDUIND    EQUALS GCOMP +3

R0399              STORAGE FOR RR TASKS.

 0400                         E3,1460   E3,1460  RRRET     ERASE
 0401                         E3,1461   E3,1461  RDES      ERASE
 0402                         E3,1462   E3,1462  RRINDEX   ERASE

R0403    AOT CALIBRATIONS IN AZIMUTH AND ELEVATION AT DETENTS
 0404                         E3,1463   E3,1465  AOTAZ     ERASE  +2
 0405                         E3,1466   E3,1470  AOTEL     ERASE  +2
R0406              ASSIGNMENTS FOR PRESENTLY UNUSED NOUNS.
 04061                                  E3,1471  AZANG     EQUALS                          DELETE WHEN OPTICAL TRACKER NOUNS GONE.
 04062                                  E3,1471  ELANG     EQUALS
 04063                                  E3,1471  DESLOTSY  EQUALS
 04064                                  E3,1471  DESLOTSX  EQUALS

 0407                         E3,1471   E3,1473  ROLL      ERASE  +2
 0408                         E3,1474   E3,1501  LANDMARK  ERASE  +5

R04081   THE FOLLOWING REGS ARE USED BY THE STANDBY VERBS

 04082                        E3,1502   E3,1503  TIMESAV   ERASE  +1
 04083                        E3,1504   E3,1505  SCALSAV   ERASE  +1
 04084                        E3,1506   E3,1507  TIMAR     ERASE  +1
 04085                        E3,1510   E3,1511  TIMEDIFF  ERASE  +1

 0409                                   E4,1400            SETLOC 2000

 0410                         E4,1400   E4,1626  AMEMORY   ERASE  +150D
R0411              THE FOLLOWING A MEMORY LOCATIONS ARE USED BY MID-COURSE NAVIGATION:

 0413    REF    1                       E4,1400  RRECT     EQUALS AMEMORY +000D
 0414    REF    2 LAST   19             E4,1400  RIGNTION  EQUALS AMEMORY +000D
 0415    REF    3 LAST   19             E4,1406  VRECT     EQUALS AMEMORY +006D
 0416    REF    4 LAST   19             E4,1406  VIGNTION  EQUALS AMEMORY +006D
 0417    REF    5 LAST   19             E4,1414  TDELTAV   EQUALS AMEMORY +012D
 0418    REF    6 LAST   19             E4,1414  NEWDLTAV  EQUALS AMEMORY +012D
 0419    REF    7 LAST   19             E4,1422  TNUV      EQUALS AMEMORY +018D
 0420    REF    8 LAST   19             E4,1422  NEWNUV    EQUALS AMEMORY +018D
 0421    REF    9 LAST   19             E4,1430  RCV       EQUALS AMEMORY +024D
 0422    REF   10 LAST   19             E4,1430  FOUNDR    EQUALS AMEMORY +024D
 0423    REF   11 LAST   19             E4,1436  VCV       EQUALS AMEMORY +030D
 0424    REF   12 LAST   19             E4,1436  FOUNDV    EQUALS AMEMORY +030D
 0425    REF   13 LAST   19             E4,1444  TC        EQUALS AMEMORY +036D
 0426    REF   14 LAST   19             E4,1446  TET       EQUALS AMEMORY +038D
 0427    REF   15 LAST   19             E4,1450  XKEP      EQUALS AMEMORY +040D
 0428    REF   16 LAST   19             E4,1452  ALPHAV    EQUALS AMEMORY +042D
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0429   REF  17 LAST  19                   E4,1452  DELR     EQUALS AMEMORY +042D
0430   REF  18 LAST  20                   E4,1460  BETAV    EQUALS AMEMORY +048D
0431   REF  19 LAST  20                   E4,1460  DELVEL   EQUALS AMEMORY +048D
0432   REF  20 LAST  20                   E4,1466  PHIV     EQUALS AMEMORY +054D
0433   REF  21 LAST  20                   E4,1466  BVECTOR  EQUALS AMEMORY +054D
0434   REF  22 LAST  20                   E4,1474  PSIV     EQUALS AMEMORY +060D
0435   REF  23 LAST  20                   E4,1502  FV       EQUALS AMEMORY +066D

0436   REF  24 LAST  20                   E4,1510  VECTAB   EQUALS AMEMORY +072D

0437   REF  25 LAST  20                   E4,1510  TAVEGON  EQUALS AMEMORY +072D
0438   REF  26 LAST  20                   E4,1512  TRESUME  EQUALS AMEMORY +074D
0439   REF  27 LAST  20                   E4,1514  RAVEGON  EQUALS AMEMORY +076D
0440   REF  28 LAST  20                   E4,1522  VAVEGON  EQUALS AMEMORY +082D
0441   REF  29 LAST  20                   E4,1530  RIG-4SEC EQUALS AMEMORY +088D
0442   REF  30 LAST  20                   E4,1554  ALPHAM   EQUALS AMEMORY +108D
0443   REF  31 LAST  20                   E4,1556  BETAM    EQUALS AMEMORY +110D
0444   REF  32 LAST  20                   E4,1560  TAU      EQUALS AMEMORY +112D
0445   REF  33 LAST  20                   E4,1560  GIVENT   EQUALS AMEMORY +112D
0446   REF  34 LAST  20                   E4,1562  DT/2     EQUALS AMEMORY +114D
0447   REF  35 LAST  20                   E4,1564  H        EQUALS AMEMORY +116D
0448   REF  36 LAST  20                   E4,1566  TDEC     EQUALS AMEMORY +118D
0449   REF  37 LAST  20                   E4,1570  FBRANCH  EQUALS AMEMORY +120D
0450   REF  38 LAST  20                   E4,1571  HBRANCH  EQUALS AMEMORY +121D
0451   REF  39 LAST  20                   E4,1572  GMODE    EQUALS AMEMORY +122D
0452   REF  40 LAST  20                   E4,1573  QREADY   EQUALS AMEMORY +123D
0453   REF  41 LAST  20                   E4,1574  MEASQ    EQUALS AMEMORY +124D
0454   REF  42 LAST  20                   E4,1576  DELTAQ   EQUALS AMEMORY +126D

0455   REF  43 LAST  20                   E4,1600  MEASMODE EQUALS AMEMORY +128D
0456   REF  44 LAST  20                   E4,1601  NVCODE   EQUALS AMEMORY +129D
0457   REF  45 LAST  20                   E4,1602  MIDEXIT  EQUALS AMEMORY +130D
0458   REF  46 LAST  20                   E4,1602  DSPRTRN  EQUALS AMEMORY +130D
0459   REF  47 LAST  20                   E4,1603  INCORPEX EQUALS AMEMORY +131D
0460   REF  48 LAST  20                   E4,1604  STEPEXIT EQUALS AMEMORY +132D
0461   REF  49 LAST  20                   E4,1605  DIFEQCNT EQUALS AMEMORY +133D
0462   REF  50 LAST  20                   E4,1605  NORMGAM  EQUALS AMEMORY +133D
0463   REF  51 LAST  20                   E4,1606  SCALEA   EQUALS AMEMORY +134D
0464   REF  52 LAST  20                   E4,1607  SCALEB   EQUALS AMEMORY +135D
0465   REF  53 LAST  20                   E4,1610  SCALEDT  EQUALS AMEMORY +136D
0466   REF  54 LAST  20                   E4,1611  SCALDELT EQUALS AMEMORY +137D
0467   REF  55 LAST  20                   E4,1612  SCALER   EQUALS AMEMORY +138D

0468   REF  56 LAST  20                   E4,1613  YV       EQUALS AMEMORY +139D
0469   REF  57 LAST  20                   E4,1621  ZV       EQUALS AMEMORY +145D

0470                           E4,1627    E4,1627  PBODY    ERASE
0471                           E4,1630    E4,1737  W        ERASE  +071D
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R0472    THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE  ENTRY AND INITIALIZATION JOB OF THE FCS TEST FOR LEM.

 0474    REF  58 LAST  20                  E4,1400  FCSCNTR  EQUALS AMEMORY +000D

R0475     THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE JETSET TASK.

R04751   (OPTIMUM PRELAUNCH A C USES JETSTEP-JETSTEP +77D FOR RESTART PROOF)

 0476    REF  59 LAST  21                  E4,1401  XJBUF    EQUALS AMEMORY +001D
 0477    REF  60 LAST  21                  E4,1402  YZJBUF   EQUALS AMEMORY +002D
 0478    REF  61 LAST  21                  E4,1403  JFBUF    EQUALS AMEMORY +003D
 0479    REF  62 LAST  21                  E4,1404  FCNTR    EQUALS AMEMORY +004D
 0480    REF  63 LAST  21                  E4,1405  THBUF    EQUALS AMEMORY +005D
 0481    REF  64 LAST  21                  E4,1406  OFFTMBUF EQUALS AMEMORY +006D
 0482    REF  65 LAST  21                  E4,1407  JETSTEP  EQUALS AMEMORY +007D
 0483    REF  66 LAST  21                  E4,1410  NTIMES   EQUALS AMEMORY +008D
 0484    REF  67 LAST  21                  E4,1420  NEXTTIME EQUALS AMEMORY +016D
 0485    REF  68 LAST  21                  E4,1430  JETONTM  EQUALS AMEMORY +024D
 0486    REF  69 LAST  21                  E4,1440  XJETS    EQUALS AMEMORY +032D
 0487    REF  70 LAST  21                  E4,1450  YZJETS   EQUALS AMEMORY +040D
 0488    REF  71 LAST  21                  E4,1460  JETOFFTM EQUALS AMEMORY +048D

R0489      THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE ENGINE ON-OFF TASK.

 0490    REF  72 LAST  21                  E4,1470  ENGSTEP  EQUALS AMEMORY +056D
 0491    REF  73 LAST  21                  E4,1471  CYLTIMES EQUALS AMEMORY +057D
 0492    REF  74 LAST  21                  E4,1474  NEXTCYLT EQUALS AMEMORY +060D
 0493    REF  75 LAST  21                  E4,1477  ONTIME   EQUALS AMEMORY +063D
 0494    REF  76 LAST  21                  E4,1502  OFFTIME  EQUALS AMEMORY +066D
 0495    REF  77 LAST  21                  E4,1505  OFFTIMER EQUALS AMEMORY +069D

R0496     THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE TRIM TASK.

 0497    REF  78 LAST  21                  E4,1510  TRIMSTEP EQUALS AMEMORY +072D
 0498    REF  79 LAST  21                  E4,1511  NUMTIMES EQUALS AMEMORY +073D
 0499    REF  80 LAST  21                  E4,1525  STEPDLYT EQUALS AMEMORY +085D
 0500    REF  81 LAST  21                  E4,1541  TRIMONT  EQUALS AMEMORY +097D
 0501    REF  82 LAST  21                  E4,1555  TRIMOFFT EQUALS AMEMORY +109D
 0502    REF  83 LAST  21                  E4,1571  TRIMIND  EQUALS AMEMORY +121D

R0503     THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE THROTTLE TASK.

 0504    REF  84 LAST  21                  E4,1605  THRTSTEP EQUALS AMEMORY +133D
 0505    REF  85 LAST  21                  E4,1606  DOTIMES  EQUALS AMEMORY +134D
 0506    REF  86 LAST  21                  E4,1614  DELAY    EQUALS AMEMORY +140D
 0507    REF  87 LAST  21                  E4,1622  THRITIME EQUALS AMEMORY +146D
 0508    REF  88 LAST  21                  E4,1630  THCOMM1  EQUALS AMEMORY +152D
 0509    REF  89 LAST  21                  E4,1636  THCOMM2  EQUALS AMEMORY +158D

R0510    THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE INTERFACE LOOK TASK.
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 0511   REF  90 LAST  21               E4,1644  30BUF1   EQUALS AMEMORY +164D
 0512   REF  91 LAST  22               E4,1650  30BUF0   EQUALS AMEMORY +168D
 0513   REF  92 LAST  22               E4,1654  QUITLOOK EQUALS AMEMORY +172D
 0514   REF  93 LAST  22               E4,1655  CHCNTR   EQUALS AMEMORY +173D

 0515                                  E5,1400           SETLOC 2400
R0516   THE FOLLOWING ERASABLE LOCATIONS ARE UTILIZED BY THE IN-FLIGHT ALIGNMENT ROUTINES

 0518                        E5,1400   E5,1421  XSM      ERASE  +17D
 0519   REF   1                        E5,1406  YSM      =      XSM +6
 0520   REF   2 LAST  22               E5,1414  ZSM      =      XSM +12D
 0521                        E5,1422   E5,1443  XDC      ERASE  +17D
 0522   REF   1                        E5,1430  YDC      =      XDC +6
 0523   REF   2 LAST  22               E5,1436  ZDC      =      XDC +12D
 0524   REF   3 LAST  22               E5,1422  XNB      =      XDC
 0525   REF   4 LAST  22               E5,1430  YNB      =      XDC +6
 0526   REF   5 LAST  22               E5,1436  ZNB      =      XDC +12D
 0527                        E5,1444   E5,1465  STARAD   ERASE  +17D
 0528                        E5,1466   E5,1473  STAR     ERASE  +5
 0529                        E5,1474   E5,1475  SAC      ERASE  +1
 0530                        E5,1476   E5,1477  PAC      ERASE  +1
 0531                        E5,1500   E5,1501  OGC      ERASE  +1
 0532                        E5,1502   E5,1503  IGC      ERASE  +1
 0533                        E5,1504   E5,1505  MGC      ERASE  +1
 0534                                     0026  ZPRIME   =      22D
 0535                                     0026  PDA      =      22D
 0536                                     0020  COSTH    =      16D
 0537                                     0022  SINTH    =      18D
 0538                                     0024  THETA    =      20D
 0539                                     0040  STARM    =      32D


R0540   THE FOLLOWING ERASABLE LOCATIONS ARE UTILIZED BY THE SYSTEM TESTS

 0541                        E5,1506   E5,1507  AZIMUTH  ERASE  +1
 0542                        E5,1510   E5,1511  LATITUDE ERASE  +1

 0543                        E5,1512   E5,1512  EROPTN   ERASE
 0544                        E5,1513   E5,1520  ERVECTOR ERASE  +5
 0545                        E5,1521   E5,1526  GYROD    ERASE  +5
 0546                        E5,1527   E5,1527  LENGTHOT ERASE
 0547                        E5,1530   E5,1535  LOSVEC   ERASE  +5
 0548                        E5,1536   E5,1536  NBPOS    ERASE
 0549                        E5,1537   E5,1537  NDXCTR   ERASE
 0550                        E5,1540   E5,1540  PIPANO   ERASE
 0551                        E5,1541   E5,1541  PIPINDEX ERASE
 0552                        E5,1542   E5,1543  PIPNDX   ERASE  +1
 0553                        E5,1544   E5,1544  POSITON  ERASE
 0554                        E5,1545   E5,1545  QPLAC    ERASE
 0555                        E5,1546   E5,1546  QPLACE    ERASE
 0556                        E5,1547   E5,1547  QPLACES   ERASE
 0557                        E5,1550   E5,1550  RUN       ERASE
 0558                        E5,1551   E5,1551  STOREPL   ERASE
 0559                        E5,1552   E5,1552  SOUTHDR   ERASE
 0560                        E5,1553   E5,1560  TAZEL1    ERASE   +5
 0561                        E5,1561   E5,1562  TEMPTIME  ERASE   +1
 0562                        E5,1563   E5,1563  TESTNO    ERASE
 0563                        E5,1564   E5,1565  TMARK     ERASE   +1
 0564                        E5,1566   E5,1566  SHAFTA    ERASE
 0565                        E5,1567   E5,1567  TRUNA     ERASE
 0566    REF    1                      E5,1776  ZERONDX   =       ERCOMP +5
 0567                        E5,1570   E5,1747  GENPL     ERASE   +111D

 0568    REF    1                      E5,1570  CDUTIMEI  =       GENPL
 0569    REF    2 LAST   23            E5,1572  CDUTIMEF  =       GENPL +2
 0570    REF    3 LAST   23            E5,1574  CDUDANG   =       GENPL +4
 0571    REF    4 LAST   23            E5,1575  CDUREADF  =       GENPL +5
 0572    REF    5 LAST   23            E5,1576  CDUREADI  =       GENPL +6
 0573    REF    6 LAST   23            E5,1577  CDULIMIT  =       GENPL +7

 0574    REF    7 LAST   23            E5,1574  TEMPADD   =       GENPL +4
 0575    REF    8 LAST   23            E5,1575  TEMP      =       GENPL +5
 0576    REF    9 LAST   23            E5,1576  NOBITS    =       GENPL +6
 0577    REF   10 LAST   23            E5,1577  CHAN      =       GENPL +7

 0578    REF   11 LAST   23            E5,1600  LOS1      =       GENPL +8D
 0579    REF   12 LAST   23            E5,1606  LOS2      =       GENPL +14D

 0580    REF   13 LAST   23            E5,1614  CALCDIR   EQUALS  GENPL +20D
 0581    REF   14 LAST   23            E5,1615  CDUFLAG   EQUALS  GENPL +21D
 0582    REF   15 LAST   23            E5,1616  GYTOBETQ  EQUALS  GENPL +22D
 0583    REF   16 LAST   23            E5,1617  OPTNREG   EQUALS  GENPL +23D
 0584    REF   17 LAST   23            E5,1620  SAVE      EQUALS  GENPL +24D          THREE CONSEC LOC
 0585    REF   18 LAST   23            E5,1623  SFCONST1  EQUALS  GENPL +27D
 0586    REF   19 LAST   23            E5,1624  TIMER     EQUALS  GENPL +28D

 0587    REF   20 LAST   23            E5,1626  DATAPL    EQUALS  GENPL +30D
 0588    REF   21 LAST   23            E5,1570  RDSP      EQUALS  GENPL               FIX LATER   POSSIBLY KEEP1
 0589    REF   22 LAST   23            E5,1670  MASKREG   EQUALS  GENPL +64D
 0590    REF   23 LAST   23            E5,1672  CDUNDX    EQUALS  GENPL +66D
 0591    REF   24 LAST   23            E5,1673  RESULTCT  EQUALS  GENPL +67D
 0592    REF   25 LAST   23            E5,1676  COUNTPL   EQUALS  GENPL +70D

 0593    REF   26 LAST   23            E5,1677  CDUANG    EQUALS  GENPL +71D
 0594    REF   27 LAST   23            E5,1570  AINLA     =       GENPL               110 DEC OR 156 OCT LOCATIONS

 0595    REF    1                      E5,1570  WANGO     EQUALS  AINLA               VERT ERATE
 0596    REF    2 LAST   23            E5,1572  WANGI     EQUALS  AINLA +2D           HO
 0597    REF    3 LAST   23            E5,1574  WANGT     EQUALS  AINLA +4D           T
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0598     REF     1                           E5,1574  TORQNDX   =       WANGT
0599     REF     4 LAST  23                  E5,1576  DRIFTT    EQUALS  AINLA +6D       EAST AX
0600     REF     5 LAST  24                  E5,1600  ALX1S     EQUALS  AINLA +8D       IN
0601     REF     6 LAST  24                  E5,1601  CMPX1     EQUALS  AINLA +9D       IND
0602     REF     7 LAST  24                  E5,1602  ALK       EQUALS  AINLA +10D      GAINS
0603     REF     8 LAST  24                  E5,1616  VLAUNS    EQUALS  AINLA +22D
06031    REF     1                           E5,1616  THETAX    =       VLAUNS
0604     REF     9 LAST  24                  E5,1620  WPLATO    EQUALS  AINLA +24D
0605     REF    10 LAST  24                  E5,1624  INTY      EQUALS  AINLA +28D      SOUTH PIP INTE
0606     REF    11 LAST  24                  E5,1626  ANGZ      EQUALS  AINLA +30D      EAST AXIS
0607     REF    12 LAST  24                  E5,1630  INTZ      EQUALS  AINLA +32D      EAST PIP I
0608     REF    13 LAST  24                  E5,1632  ANGY      EQUALS  AINLA +34D      SOUTH
06081    REF     1                           E5,1624  THETAN    =       INTY
0609     REF    14 LAST  24                  E5,1634  ANGX      EQUALS  AINLA +36D      VE
0610     REF    15 LAST  24                  E5,1636  DRIFTO    EQUALS  AINLA +38D      VERT
0611     REF    16 LAST  24                  E5,1640  DRIFTI    EQUALS  AINLA +40D      SOU
0612     REF    17 LAST  24                  E5,1644  VLAUN     EQUALS  AINLA +44D      LAUNCH
06121    REF     1                           E5,1644  FILDELV   =       VLAUN
0613     REF    18 LAST  24                  E5,1646  ACCWD     EQUALS  AINLA +46D      LAUN
06131    REF     1                           E5,1646  INTVEC    =       ACCWD
0614     REF    19 LAST  24                  E5,1654  POSNV     EQUALS  AINLA +52D      LAUNC
0615     REF    20 LAST  24                  E5,1656  DPIPAY    EQUALS  AINLA +54D      SOUTH
0616     REF    21 LAST  24                  E5,1662  DPIPAZ    EQUALS  AINLA +58D      NORTH PIP INCREMENT
0617     REF    22 LAST  24                  E5,1664  ALTIM     EQUALS  AINLA +60D      LENG
0618     REF    23 LAST  24                  E5,1665  ALTIMS    EQUALS  AINLA +61D       INDEX
0619     REF    24 LAST  24                  E5,1666  ALDK      EQUALS  AINLA +62D       TIME CONSTAN
0620     REF    25 LAST  24                  E5,1704  DELM      EQUALS  AINLA +76D
0621     REF    26 LAST  24                  E5,1714  WPLATI    EQUALS  AINLA +84D
0622     REF    27 LAST  24                  E5,1716  GEOSAVED  EQUALS  AINLA +86D
0623     REF    28 LAST  24                  E5,1717  PREMTRXC  EQUALS  AINLA +87D
0624     REF    29 LAST  24                  E5,1720  PRELMTRX  EQUALS  AINLA +88D
0625     REF     1                           E5,1720  TRANSM1   =       PRELMTRX
0626     REF    30 LAST  24                  E5,1742  GEOCOMPS  EQUALS  AINLA +106D
0627     REF    31 LAST  24                  E5,1743  GTSOPNDZ  EQUALS  AINLA +107D
0628     REF    32 LAST  24                  E5,1744  1SECXT    EQUALS  AINLA +108D
0629     REF    33 LAST  24                  E5,1745  GTSWTLST  EQUALS  AINLA +109D
0630     REF    34 LAST  24                  E5,1746  ERECTIME  EQUALS  AINLA +110D
0631     REF    35 LAST  24                  E5,1747  GEOMTRX   EQUALS  AINLA +111D
0632     REF    36 LAST  24                  E5,1771  ERCOMP    EQUALS  AINLA +129D
```

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L       ERASABLE ASSIGNMENTS                                                     USER'S OWN PAGE NO.  19

 0647   REF  28 LAST  23                E5,1570  BMEMORY  EQUALS GENPL
 0668   REF   1                            0405  DELVY    EQUALS DELVX +2
 0669   REF   2 LAST  25                   0407  DELVZ    EQUALS DELVX +4
 0832                                   E7,1400           SETLOC 3400

R0833            DOWNLINK STORAGE.

 0834                        E7,1400   E7,1400  LDATALST ERASE
 0835                        E7,1401   E7,1401  DNTMGOTO ERASE
 0836                        E7,1402   E7,1402  TMINDEX  ERASE
 0837                        E7,1403   E7,1430  DNTMBUFF ERASE  +21D            SNAPSHOT BUFFER.

R0838            RADAR TEST STORAGE.

 0839                        E7,1431   E7,1431  RTSTDEX  ERASE
 0840                        E7,1432   E7,1432  RTSTMAX  ERASE                  66 FOR HI SPEED, 6 FOR LOW SPEED RR,
A0841                                                                           AND 18 FOR LOW SPEED LR.
 0842                        E7,1433   E7,1433  RTSTBASE ERASE                  USED FOR CYCLIC SAMPLING.
 0843                        E7,1434   E7,1434  RTSTLOC  ERASE                  GOES 0(6)RTSTMAX
 0844   REF   1                        E7,1434  RSTKLOC  EQUALS RTSTLOC
 0845                        E7,1435   E7,1435  RSAMPDT  ERASE                  PNZ FOR CYCLIC SAMPLING, -1 FOR HI SPEED
A0846                                                                           INSERT +0 HERE MANUALLY TO TERMINATE TST
 0847                        E7,1436   E7,1436  RFAILCNT ERASE
 0848                        E7,1437   E7,1546  RSTACK   ERASE  +71D            BUFFERS FOR RADAR TESTING.

R0849   AGS INITIALIZATION
 0850                        E7,1547   E7,1602  AGSBUFF  ERASE  +27D
R0851            STORAGE FOR INBIT SCANNER.

 0852                        E7,1603   E7,1605  LAST30   ERASE  +2              LAST SAMPLED INBITS.
 0853                        E7,1606   E7,1606  MSGCNT   ERASE
```

```
L        INPUT/OUTPUT CHANNELS                                              USER'S OWN PAGE NO.   1

 0001                                       0003  HISCALAR EQUALS 3
 0002                                       0004  LOSCALAR EQUALS 4
 0003                                       0010  OUT0     EQUALS 10
 0004                                       0011  DSALMOUT EQUALS 11
 0005                                       0012  CHAN12   EQUALS 12
 0006                                       0013  CHAN13   EQUALS 13
 0007                                       0014  CHAN14   EQUALS 14
 0008                                       0015  MNKEYIN  EQUALS 15
 0009                                       0016  NAVKEYIN EQUALS 16
 0010                                       0033  CHAN33   EQUALS 33
 0011                                       0034  DNTM1    EQUALS 34
 0012                                       0035  DNTM2    EQUALS 35
R0013    END OF CHANNEL ASSIGNMENTS
```

```
L        INTERRUPT LEAD INS                                                      USER'S OWN PAGE NO.   1

0001                                    4000           SETLOC 4000

0002                          4000  0 0004 0           INHINT               GO
0003   REF    1               4001  3 4054 1           CAF     GOBB
0004   REF    1               4002  56 006 1           XCH     BBANK
0005   REF    1               4003  1 2072 1           TCF     GOPROG

0006   REF    1               4004  52 011 0           DXCH    ARUPT        HERE ON A T6 RUPT
0007                          4005  0 0006 1           EXTEND
0008   REF    1               4006  22 012 1           QXCH    QRUPT
0009   REF    1               4007  1 4175 1           TCF     DOT6RUPT     DOT6RUPT IS IN FIX-FIXED.(INTR-BANK COM)

0010   REF    2 LAST   27     4010  52 011 0           DXCH    ARUPT        T5RUPT
0011                          4011  0 0006 1           EXTEND
0012   REF    2 LAST   14     4012  3 0346 0           DCA     T5LOC        T5LOC EQUALS T5ADR
0013                          4013  52 006 0           DTCB

0014   REF    3 LAST   27     4014  52 011 0           DXCH    ARUPT        T3RUPT
0015   REF    1               4015  3 4056 0           CAF     T3RPTBB
0016   REF    2 LAST   27     4016  56 006 1           XCH     BBANK
0017   REF    1               4017  1 2736 0           TCF     T3RUPT

0018   REF    4 LAST   27     4020  52 011 0           DXCH    ARUPT        T4RUPT
0019   REF    1               4021  3 7665 0           CAF     ZERO
0020   REF    1               4022  1 4713 1           TCF     T4RUPT
0021   REF    1                             E6         EBANK=  M11
0022   REF    1               4023    24006 1  T4RPTBB BBCON   T4RUPTA

0023   REF    5 LAST   27     4024  52 011 0           DXCH    ARUPT        KEYRUPT1
0024   REF    1               4025  3 4057 1           CAF     KEYRPTBB
0025   REF    3 LAST   27     4026  56 006 1           XCH     BBANK
0026   REF    1               4027  1 2362 0           TCF     KEYRUPT1

0027   REF    6 LAST   27     4030  52 011 0           DXCH    ARUPT        KEYRUPT2
0028   REF    1               4031  3 4060 0           CAF     MKRUPTBB
0029   REF    4 LAST   27     4032  56 006 1           XCH     BBANK
0030   REF    1               4033  1 3161 0           TCF     MARKRUPT

0031   REF    7 LAST   27     4034  52 011 0           DXCH    ARUPT        UPRUPT
0032   REF    1               4035  3 4057 1           CAF     UPRPTBB
0033   REF    5 LAST   27     4036  56 006 1           XCH     BBANK
0034   REF    1               4037  1 2402 1           TCF     UPRUPT

0035   REF    8 LAST   27     4040  52 011 0           DXCH    ARUPT        DOWNRUPT
0036   REF    1               4041  3 4061 1           CAF     DWNRPTBB
0037   REF    6 LAST   27     4042  56 006 1           XCH     BBANK
0038   REF    1               4043  1 2047 1           TCF     DODOWNTM

0039   REF    9 LAST   27     4044  52 011 0           DXCH    ARUPT        RADAR RUPT
0040   REF    1               4045  3 4062 1           CAF     RDRPTBB
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L       INTERRUPT LEAD INS                                                                  USER'S OWN PAGE NO.   2

 0041   REF    7 LAST  27         4046  56 006 1             XCH     BBANK
 0042   REF    1                  4047  1 2707 1             TCF     RADAREAD

R00421  TRAPS 31B AND 32 SHOULD NEVER BE SET. THEREFORE-
R00422  RUPT 10 WILL ALWAYS REFER TO THE HAND CONTROLLER LPD OR MINIMUM IMPULSE
R00423  USE. SEE GEORGE CHERRY FOR RATIONALE REGARDING THE AFORESAID.

 0043   REF   10 LAST  27         4050  52 011 0             DXCH    ARUPT               RUPT 10 USED FOR RHC MINIMP MODE ONLY.
 0044   REF    1                  4051  3 7656 0             CAF     TWO
 0045   REF    1                  4052  54 773 0             TS      DELAYCTR
 0046   REF    1                  4053  1 4610 0             TCF     NOQRSM

 0047   REF    1                            E3               EBANK=  LST1                RESTART USES E0, E3
 0048   REF    2 LAST  27         4054   24003 1  GOBB       BBCON   GOPROG

 0049   REF    1                            E0               EBANK=  TIME1
 0050   REF    1                  4055   04000 0  T6RPTBB    BBCON   RESUME              ***FIX LATER***

 0051   REF    2 LAST  28                   E3               EBANK=  LST1
 0052   REF    2 LAST  27         4056   02003 0  T3RPTBB    BBCON   T3RUPT

 0053   REF    1                            E0               EBANK=  KEYTEMP1
 0054   REF    2 LAST  27         4057   16000 0  KEYRPTBB   BBCON   KEYRUPT1

 0055   REF    1                            E3               EBANK=  AOTAZ
 0056   REF    2 LAST  27         4060   26003 0  MKRUPTBB   BBCON   MARKRUPT

 0057   REF    2 LAST  27                  4057   UPRPTBB    =       KEYRPTBB

 0058   REF    1                            E7               EBANK=  DNTMBUFF
 0059   REF    2 LAST  27         4061   32007 1  DWNRPTBB   BBCON   DODOWNTM

 0060   REF    1                            E1               EBANK=  RADMODES
 0061   REF    2 LAST  28         4062   20001 1  RDRPTBB    BBCON   RADAREAD

 0062                                      4063   ENDINTFF   EQUALS
```

```
L       INTER-BANK COMMUNICATION                                            USER'S OWN PAGE NO.   1

R0001            THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
R0003   CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

 0005   REF   1                            4063          SETLOC ENDINTFF

 0006   REF   1                   4063  52 120 0  BANKCALL DXCH   BUF2              SAVE INCOMING A,L.
 0007   REF   1                   4064  50 002 0           INDEX  Q                 PICK UP CADR.
 0008                             4065  3 0000 1           CA     0
 0009   REF   2 LAST  29          4066  24 002 0           INCR   Q                 SO WE RETURN TO THE LOC. AFTER THE CADR.

R0010            SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

 0012   REF   1                   4067  54 001 1  SWCALL   TS     L
 0013   REF   1                   4070  22 004 0           LXCH   FBANK             SWITCH BANKS, SAVING RETURN.
 0014   REF   1                   4071  7 6426 0           MASK   LOW10             GET SUB-ADDRESS OF CADR.
 0015   REF   3 LAST  29          4072  56 002 0           XCH    Q                 A,L NOW CONTAINS DP RETURN.
 0016   REF   2 LAST  29          4073  52 120 0           DXCH   BUF2              RESTORING INPUTS IF THIS IS A BANKCALL.
 0017   REF   4 LAST  29          4074  50 002 0           INDEX  Q
 0018                             4075  0 2000 0           TC     10000             SETTING Q TO SWRETURN.

 0019   REF   3 LAST  29          4076  56 120 1  SWRETURN XCH    BUF2 +1           COMES HERE TO RETURN TO CALLER. C(A,L)
 0020   REF   2 LAST  29          4077  56 004 0           XCH    FBANK             ARE PRESERVED FOR RETURN.
 0021   REF   4 LAST  29          4100  56 120 1           XCH    BUF2 +1
 0022   REF   5 LAST  29          4101  0 0117 0           TC     BUF2


R0023            THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
R0025   FOLLOWING THE TC POSTJUMP INSTRUCTION.

 0026   REF   5 LAST  29          4102  56 002 0  POSTJUMP XCH    Q                 SAVE INCOMING C(A).
 0027   REF   1                   4103  50 000 1           INDEX  A                 GET CADR.
 0028                             4104  3 0000 1           CA     0

R0029            BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

 0031   REF   3 LAST  29          4105  54 004 1  BANKJUMP TS     FBANK
 0032   REF   2 LAST  29          4106  7 6426 0           MASK   LOW10
 0033   REF   6 LAST  29          4107  56 002 0           XCH    Q                 RESTORING INPUT C(A) IF THIS WAS A
 0034   REF   7 LAST  29          4110  50 002 0           INDEX  Q                 POSTJUMP.
 0035                             4111  1 2000 1           TCF    10000
```

```
P0036            THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

 0038   REF    3 LAST  29        4112  3 6426 1  MAKECADR CAF      LOW10
 0039   REF    6 LAST  29        4113  7 0117 1           MASK     BUF2
 0040   REF    7 LAST  30        4114  6 0120 1           AD       BUF2 +1
 0041   REF    8 LAST  29        4115  0 0002 0           TC       Q


R0042            THE FOLLOWING ROUTINE OBTAINS THE TWO WORDS BEGINNING AT THE ADDRESS ARRIVING IN A, AND LEAVES THEM IN
R0044   A,L.

 0045   REF    2 LAST  29        4116  54 001 1  DATACALL TS       L
 0046   REF    4 LAST  29        4117  22 004 0           LXCH     FBANK
 0047   REF    1                 4120  22 121 0           LXCH     MPTEMP          SAVE FORMER BANK.
 0048   REF    4 LAST  30        4121  7 6426 0           MASK     LOW10
 0049                            4122  0 0006 1           EXTEND
 0050   REF    2 LAST  29        4123  5 0000 1           INDEX    A
 0051                            4124  3 2001 1           DCA      10000

 0052   REF    2 LAST  30        4125  56 121 0           XCH      MPTEMP
 0053   REF    5 LAST  30        4126  54 004 1           TS       FBANK           RESTORE FBANK.
 0054   REF    3 LAST  30        4127  3 0121 0           CA       MPTEMP
 0055   REF    9 LAST  30        4130  0 0002 0           TC       Q
```

```
L        INTER-BANK COMMUNICATION                                                        USER'S OWN PAGE NO.   3

P0056              THE FOLLOWING SUBROUTINES PROVIDE TO THE BASIC PROGRAMMER ENTRY INTO AND RETURN FROM ANY INTERPRETIVE
R0058    CODING WHICH DOES NOT USE THE ENTERING CONTENTS OF Q AND WHICH RETURNS VIA DANZIG. C(A) AND C(L) ARE SAVED.

R0060    USER'S RESPONSIBILITY TO FILL IN ADVANCE THE APPROPRIATE OPERAND AND ADDRESS REGISTERS USED BY THE
R0062    INTERPRETIVE CODING SUCH AS MPAC, BUF, ADDRWD, ETC.; AND TO CONFIRM THAT THE INTERPRETIVE CODING MEETS THE
R0064    ABOVE RESTRICTIONS WITH RESPECT TO Q AND DANZIG.

R0065    USEPRET AND USPRCADR MUST NOT BE USED IN INTERRUPT.

R0066    1. USEPRET ACCESSES INTERPRETIVE CODING WHICH CAN BE ENTERED WITHOUT CHANGING FBANK.
R0068       THE CALLING SEQUENCE IS AS FOLLOWS:

A0069                                                  L           TC       USEPRET
A0070                                                  L+1         TC,TCF   INTPRETX             TC,TCF MEANS TC OR TCF
A0071                                                                                            INTPRETX IS THE INTERPRETIVE CODING
A0072                                                                                            RETURN IS TO L+2

R0073    2. USPRCADR ACCESSES INTERPRETIVE CODING IN OTHER THAN THE USER'S FBANK. THE CALLING SEQUENCE IS AS FOLLOWS:

A0075                                                  L           TC       USPRCADR
A0076                                                  L+1         CADR     INTPRETX             INTPRETX IS THE INTERPRETIVE CODING
A0077                                                                                            RETURN IS TO L+2

 0078    REF  10 LAST  30         4131  56 002 0  USEPRET   XCH      Q                    FETCH Q, SAVING A
 0079    REF   1                  4132  54 150 1            TS       LOC                  L+1 TO LOC
 0080    REF   6 LAST  30         4133  3 0004 0            CA       FBANK
 0081    REF   1                  4134  54 151 0            TS       BANKSET              USERS BANK TO BANKSET
 0082    REF   1                  4135  3 7650 0            CA       BIT8
 0083    REF   1                  4136  54 023 1            TS       EDOP                 EXIT INSTRUCTION TO EDOP
 0084    REF  11 LAST  31         4137  3 0002 0            CA       Q                    RETRIEVE ORIGINAL A
 0085    REF   2 LAST  31         4140  0 0150 0            TC       LOC

 0086    REF   3 LAST  31         4141  54 150 1  USPRCADR  TS       LOC                  SAVE A
 0087    REF   2 LAST  31         4142  3 7650 0            CA       BIT8
 0088    REF   2 LAST  31         4143  54 023 1            TS       EDOP                 EXIT INSTRUCTION TO EDOP
 0089    REF   7 LAST  31         4144  3 0004 0            CA       FBANK
 0090    REF   2 LAST  31         4145  54 151 0            TS       BANKSET              USERS BANK TO BANKSET
 0091    REF  12 LAST  31         4146  50 002 0            INDEX    Q
 0092                             4147  3 0000 1            CA       0
 0093    REF   8 LAST  31         4150  54 004 1            TS       FBANK                INTERPRETIVE BANK TO FBANK
 0094    REF   5 LAST  30         4151  7 6426 0            MASK     LOW10                YIELDS INTERPRETIVE RELATIVE ADDRESS
 0095    REF  13 LAST  31         4152  56 002 0            XCH      Q                    INTERPRETIVE ADDRESS TO Q, FETCHING L+1
 0096    REF   4 LAST  31         4153  56 150 0            XCH      LOC                  L+1 TO LOC, RETRIEVING ORIGINAL A
 0097    REF  14 LAST  31         4154  50 002 0            INDEX    Q
 0098                             4155  1 2000 1            TCF      10000
```

```
P0099            THE FOLLOWING ROUTINES ARE IDENTICAL TO BANKCALL AND SWCALL EXCEPT THAT THEY ARE USED IN INTERRUPT.

 0101   REF   1                4156  52 077 0  IBNKCALL DXCH    RUPTREG3        USES RUPTREG3,4 FOR DP RETURN ADDRESS.
 0102   REF  15 LAST  31       4157  50 002 0           INDEX   Q
 0103                          4160  3 0000 1           CAF     0
 0104   REF  16 LAST  32       4161  24 002 0           INCR    Q

 0105   REF   3 LAST  30       4162  54 001 1  ISWCALL  TS      L
 0106   REF   9 LAST  31       4163  22 004 0           LXCH    FBANK
 0107   REF   6 LAST  31       4164  7 6426 0           MASK    LOW10
 0108   REF  17 LAST  32       4165  56 002 0           XCH     Q
 0109   REF   2 LAST  32       4166  52 077 0           DXCH    RUPTREG3
 0110   REF  18 LAST  32       4167  50 002 0           INDEX   Q
 0111                          4170  0 2000 0           TC      10000

 0112   REF   3 LAST  10       4171  56 077 1  ISWRETRN XCH     RUPTREG4
 0113   REF  10 LAST  32       4172  56 004 0           XCH     FBANK
 0114   REF   4 LAST  32       4173  56 077 1           XCH     RUPTREG4
 0115   REF   3 LAST  32       4174  0 0076 0           TC      RUPTREG3
```

```
L       INTER-BANK COMMUNICATION                                                          USER'S OWN PAGE NO.   5

P0116   T6-RUPT PROGRAMS.


R0117   ENTER HERE AFTER A T6-RUPT.DETERMINE IF IT IS A GENUINE RUPT.

 0118   REF    1                  4175  0 4177 1  DOT6RUPT TC      T6JOBCHK
 0119   REF    2 LAST  28         4176  1 4606 1           TCF     RESUME

R0120   T6JOBCHK DETERMINES IF T6 = -0 ( A T6 RUPT HAS OCCURRED ) OR IF T6
R0121      EQUALS +0 ( T6 NOT COUNTING DOWN ) OR =SOME POS.OR NEG. NUMBER ( T6
R0122      BEING DECREMENTED AND NO RUPT IS NEEDED ).

 0123   REF    1                  4177  10 031 1  T6JOBCHK CCS     TIME6
 0124   REF   19 LAST  32         4200  0 0002 0           TC      Q
 0125   REF   20 LAST  33         4201  0 0002 0           TC      Q
 0126   REF   21 LAST  33         4202  0 0002 0           TC      Q
R0127   T6JOB EXECUTES A JET STATE CHANGE AND SETS UP ANY ADDITIONAL T6 RUPTS
R0128      WHICH MIGHT BE NECESSARY.

 0129   REF    2 LAST  27         4203  3 7665 0  T6JOB    CA      ZERO
 0130   REF    1                  4204  56 767 1           XCH     T6NEXT +1
 0131   REF    2 LAST  33         4205  56 766 0           XCH     T6NEXT
 0132   REF    2 LAST  33         4206  54 031 1           TS      TIME6
 0133                             4207  0 0006 1           EXTEND
 0134   REF    1                  4210  1 4230 0           BZF     T6ZERO
 0135   REF    1                  4211  3 7641 0           CA      BIT15
 0136                             4212  0 0006 1           EXTEND
 0137                             4213  05 013 0           WOR     13
 0138   REF    3 LAST  33         4214  3 7665 0           CA      ZERO
 0139   REF    1                  4215  56 772 0           XCH     T6NEXTJT +2
 0140   REF    2 LAST  33         4216  56 771 0           XCH     T6NEXTJT +1
 0141   REF    3 LAST  33         4217  56 770 1           XCH     T6NEXTJT
 0142                             4220  0 0006 1  WRITEJTS EXTEND
 0143   REF    1                  4221  6 4225 0           BZMF    WRITEQR
 0144                             4222  0 0006 1           EXTEND
 0145                             4223  01 006 0           WRITE   6
 0146   REF   22 LAST  33         4224  0 0002 0           TC      Q
 0147                             4225  0 0006 1  WRITEQR  EXTEND
 0148                             4226  01 005 0           WRITE   5
 0149   REF   23 LAST  33         4227  0 0002 0           TC      Q
 0150   REF    4 LAST  33         4230  3 0770 1  T6ZERO   CA      T6NEXTJT
 0151   REF    1                  4231  1 4220 1           TCF     WRITEJTS
 0152                                   4232  END1BNKF EQUALS
```

```
L        LIST-PROCESSING INTERPRETER                                                         USER'S OWN PAGE NO.    1

R0001    SECTION 1  DISPATCHER

R0002              ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST  INSTRUCTION, BANKSET TO THE FBANK OF THE
R0004    OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006    VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008    (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPER-BANK,
R0010    NOR DOES IT SWITCH EBANKS. MOST EBANK SWITCHING IS DONE BY THE EXECUTIVE PROGRAM.


 0012                                 6000            SETLOC 6000

 0013                           6000  0 0006 1  INTPRET  EXTEND                     SET LOC TO THE WORD FOLLOWING THE TC.
 0014    REF    5 LAST  31      6001  22 150 0           QXCH    LOC

 0015    REF   11 LAST  32      6002  3 0004 0   +2      CA      FBANK              INTERPRETIVE BRANCHES FINISH HERE.
 0016    REF    3 LAST  31      6003  54 151 0           TS      BANKSET
 0017    REF    2 LAST  33      6004  7 7641 1           MASK    BIT15              GET 15TH BIT FOR INDEXABLE ADDRESSES.
 0018    REF    5 LAST  10      6005  54 101 0           TS      INTBIT15
 0019    REF    7 LAST  32      6006  6 6426 1           AD      LOW10              THIS VERSION IS USED IN PROCESSING
 0020    REF    4 LAST  10      6007  54 100 1           TS      INTB15+            INDEXABLE FIXED-BANK ADDRESSES.

 0021    REF    1               6010  1 6023 1           TCF     NEWOPS             PICK UP OP CODE PAIR AND BEGIN.


 0022    REF    8 LAST  28      6011  22 006 1  INTRSM   LXCH    BBANK              RESUME SUSPENDED INTERPRETIVE JOB
 0023    REF    1               6012  1 6003 0           TCF     INTPRET +3         (ACTUALLY PART OF THE EXECUTIVE).
```

```
P0024               AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

 0026   REF    1                     6013   54 147 1  NEWMODE  TS       MODE              PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0027   REF    4 LAST  34            6014   3 0151 1  DANZIG   CA       BANKSET           SET FBANK BEFORE TESTING NEWJOB SO THAT
 0028   REF   12 LAST  34            6015   54 004 1           TS       FBANK             BBANK MAY BE SAVED DIRECTLY BY CHANJOB.

 0029   REF    3 LAST  31            6016   10 023 1  NOIBNKSW CCS      EDOP              SEE IF AN ORDER CODE IS LEFT OVER FROM
 0030   REF    1                     6017   1 6032 1           TCF      OPJUMP            THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0031                                                                                     EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0032   REF    1                     6020   10 067 1           CCS      NEWJOB            SEE IF A JOB OF HIGHER PRIORITY IS
 0033   REF    1                     6021   1 4412 0           TCF      CHANG2            PRESENT, AND IF SO, CHANGE JOBS.

 0034   REF    6 LAST  34            6022   24 150 0           INCR     LOC               ADVANCE THE LOCATION COUNTER.
 0035   REF    7 LAST  35            6023   50 150 0  NEWOPS   INDEX    LOC               ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0036                                6024   3 0000 1           CA       0                 MAY BE AN OPCODE PAIR OR A STORE CODE.
 0037   REF    3 LAST  30            6025   10 000 0           CCS      A                 TEST SIGN AND GET DABS(A).
 0038   REF    1                     6026   1 6342 0           TCF      DOSTORE           PROCESS STORE CODE.

 0039                                6027    00177 0  LOW7     OCT      177

 0040   REF    4 LAST  35            6030   54 023 1           TS       EDOP              OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0041   REF    1                     6031   7 6027 0           MASK     LOW7              WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0042   REF    1                     6032   54 020 1  OPJUMP   TS       CYR               LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0043   REF    2 LAST  35            6033   10 020 1           CCS      CYR               CODE IS TO BE PROCESSED. TEST PREFICES.
 0044   REF    1                     6034   1 6167 0           TCF      OPJUMP2           TEST SECOND PREFIX BIT.

 0045   REF    1                     6035   1 6731 0           TCF      EXIT              +0 OP CODE IS EXIT.
```

```
L        LIST-PROCESSING INTERPRETER                                                       USER'S OWN PAGE NO.   3

P0046              PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

 0048    REF    1                 6036   7 7657 0  ADDRESS   MASK    BIT1                SEE IF ADDRESS IS INDEXED. CYR CONTAINED
 0049    REF    4 LAST   35       6037  10 000 0             CCS     A                   400XX, SO BIT 1 IS NOW AS IT WAS IN CYR.
 0050    REF    1                 6040   1 6073 1             TCF     INDEX               FORM INDEXED ADDRESS.

 0051    REF    8 LAST   35       6041  50 150 0  DIRADRES  INDEX   LOC                 LOOK AHEAD TO NEXT WORD TO SEE IF
 0052                             6042   4 0001 1  OCT40001  CS      1                   ADDRESS IS GIVEN.
 0053    REF    5 LAST   36       6043  10 000 0             CCS     A
 0054    REF    1                 6044   1 6135 1             TCF     PUSHUP              IF NOT.

 0055                             6045    77773 1  NEG4      DEC     -4

 0056    REF    9 LAST   36       6046  24 150 0             INCR    LOC                 IF SO, TO SHOW WE PICKED UP A WORD.
 0057    REF    1                 6047  54 102 0             TS      ADDRWD
```

```
P0058            FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0060      REQUIRED 12 BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED BANK SWITCHING DONE (F ONLY). ADDRESSES LESS
R0062      THAN 450 ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.


 0064  REF    1                 6050  6 6171 0            AD      -ENDVAC         SEE IF ADDRESS RELATIVE TO WORK AREA.
 0065  REF    6 LAST  36        6051  10 000 0            CCS     A
 0066  REF    1                 6052  6 6234 1            AD      -ENDERAS        IF NOT, SEE IF IN GENERAL ERASABLE.
 0067  REF    1                 6053  1 6060 0            TCF     IERASTST

 0068  REF    1                 6054  3 0104 1  NETZERO   CA      FIXLOC          IF SO, LEAVE THE MODIFIED ADDRESS IN
 0069  REF    2 LAST  36        6055  26 102 0            ADS     ADDRWD          ADDRWD AND DISPATCH.
 0070  REF    3 LAST  35        6056  50 020 0   +2       INDEX   CYR             THIS INDEX MAKES THE NEXT INSTRUCTION
 0071  REF    1                 6057  7 6234 0            7       INDJUMP -1      TCF INDJUMP + OP, EDITING CYR.

 0072                           6060  0 0006 1  IERASTST  EXTEND
 0073  REF    1                 6061  6 6056 1            BZMF    NETZERO +2      GENERAL ERASABLE - DISPATCH IMMEDIATELY.

 0074  REF    5 LAST  34        6062  6 0100 0  FIXEDADR  AD      INTB15+         FIXED BANK ADDRESS. RESTORE AND ADD B15.
 0075  REF   13 LAST  35        6063  54 004 1   +1       TS      FBANK           SWITCH BANKS AND LEAVE SUB-ADDRESS IN
 0076  REF    8 LAST  34        6064  7 6426 0            MASK    LOW10           ADDRWD FOR OPERAND RETRIEVAL.
 0077  REF    1                 6065  6 7645 1            AD      2K
 0078  REF    3 LAST  37        6066  54 102 0            TS      ADDRWD
 0079  REF    4 LAST  37        6067  50 020 0            INDEX   CYR
 0080  REF    2 LAST  37        6070  7 6234 0            7       INDJUMP -1
```

```
L        LIST-PROCESSING INTERPRETER                                                USER'S OWN PAGE NO.   5

P0081              THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0083    CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0085    BANK, OR ANY INTEGER IN THAT RANGE.

 0086    REF    1                  6071   3 7676 1  DODLOAD* CAF     DLOAD*             STODL* COMES HERE TO PROCESS LOAD ADR.
 0087    REF    5 LAST  37         6072   54 020 1           TS      CYR                (STOVL* ENTERS HERE).

 0088    REF    2 LAST  37         6073   3 0104 1  INDEX    CA      FIXLOC             SET UP INDEX LOCATION.
 0089    REF    1                  6074   54 114 1           TS      INDEXLOC
 0090    REF   10 LAST  36         6075   24 150 0           INCR    LOC                (ADDRESS ALWAYS GIVEN).
 0091    REF   11 LAST  38         6076   50 150 0           INDEX   LOC
 0092                              6077   4 0000 0           CS      0
 0093    REF    7 LAST  37         6100   10 000 0           CCS     A                  INDEX 2 IF ADDRESS STORED COMPLEMENTED.
 0094    REF    2 LAST  38         6101   24 114 0           INCR    INDEXLOC
 0095                              6102   1 6103 1           NOOP

 0096    REF    4 LAST  37         6103   54 102 0           TS      ADDRWD             14 BIT ADDRESS TO ADDRWD.
 0097    REF    1                  6104   7 6232 0           MASK    BANKMASK           IF ADDRESS GREATER THAN 1K, ADD INTBIT15
 0098                              6105   0 0006 1           EXTEND
 0099    REF    1                  6106   1 6111 1           BZF     INDEX2
 0100    REF    6 LAST  34         6107   3 0101 1           CA      INTBIT15
 0101    REF    5 LAST  38         6110   26 102 0           ADS     ADDRWD

 0102    REF    3 LAST  38         6111   50 114 0  INDEX2   INDEX   INDEXLOC
 0103    REF    1                  6112   4 0046 1           CS      X1
 0104    REF    6 LAST  38         6113   26 102 0           ADS     ADDRWD             DO AUGMENT, IGNORING AND CORRECTING OVF.

 0105    REF    1                  6114   7 6231 0           MASK    HIGH9              SEE IF ADDRESS IS IN WORK AREA.
 0106                              6115   0 0006 1           EXTEND
 0107    REF    1                  6116   1 6131 0           BZF     INDWORK
 0108    REF    2 LAST  38         6117   7 6232 0           MASK    BANKMASK           SEE IF IN FIXED BANK.
 0109                              6120   0 0006 1           EXTEND
 0110    REF    1                  6121   1 6133 1           BZF     INDERASE

 0111    REF    7 LAST  38         6122   3 0102 1           CA      ADDRWD             IN FIXED - SWITCH BANKS AND CREATE
 0112    REF   14 LAST  37         6123   54 004 1           TS      FBANK              SUB-ADDRESS.
 0113    REF    9 LAST  37         6124   7 6426 0           MASK    LOW10
 0114    REF    2 LAST  37         6125   6 7645 1           AD      2K
 0115    REF    8 LAST  38         6126   54 102 0           TS      ADDRWD
 0116    REF    6 LAST  38         6127   50 020 0           INDEX   CYR
 0117    REF    3 LAST  37         6130   3 6234 1           3       INDJUMP -1

 0118    REF    3 LAST  38         6131   3 0104 1  INDWORK  CA      FIXLOC             MAKE ADDRWD RELATIVE TO WORK AREA.
 0119    REF    9 LAST  38         6132   26 102 0           ADS     ADDRWD

 0120    REF    7 LAST  38         6133   50 020 0  INDERASE INDEX   CYR
 0121    REF    4 LAST  38         6134   3 6234 1           3       INDJUMP -1
```

```
P0122          PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0124  LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0126  IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0128  BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0129          1.  VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0131  RESULT, VXSC WANTS A SCALAR.

R0132          2.  THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0134  INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0135          3.  SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0137  THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

 0138  REF    1                  6135  3 6227 0  PUSHUP    CAF      OCT23              IF THE LOW 5 BITS OF CYR ARE LESS THAN
 0139  REF    8 LAST  38         6136  7 0020 1            MASK     CYR                20, THIS OP REQUIRES SPECIAL ATTENTION.
 0140  REF    1                  6137  6 6142 0            AD       -OCT10             (NO -0).
 0141  REF    8 LAST  38         6140  10 000 0            CCS      A
 0142  REF    1                  6141  1 6153 1            TCF      REGUP              FOR ALL CODES GREATER THAN OCT 7.

 0143                            6142   77767 1  -OCT10    OCT      -10

 0144  REF    1                  6143  6 6045 0            AD       NEG4               WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
 0145  REF    9 LAST  39         6144  10 000 0            CCS      A                  THE OP CODE (MOD4) IS THREE (REVERSE).
 0146  REF   10 LAST  39         6145  50 000 1            INDEX    A                  NO - THE MODE IS DEFINITE. PICK UP THE
 0147  REF    1                  6146  4 6164 0            CS       NO.WDS
 0148  REF    2 LAST  39         6147  1 6155 1            TCF      REGUP +2

 0149  REF    2 LAST  35         6150  50 147 0            INDEX    MODE               FOR VXSC AND V/SC WE WANT THE REQUIRED
 0150  REF    1                  6151  4 6162 0            CS       REVCNT             PUSHLOC DECREMENT WITHOUT CHANGING THE
 0151  REF    3 LAST  39         6152  1 6155 1            TCF      REGUP +2           MODE AT THIS TIME.

 0152  REF    3 LAST  39         6153  50 147 0  REGUP     INDEX    MODE               MOST ALL OP CODES PUSHUP HERE.
 0153  REF    2 LAST  39         6154  4 6164 0            CS       NO.WDS
 0154  REF    1                  6155  26 152 0   +2       ADS      PUSHLOC
 0155  REF   10 LAST  38         6156  54 102 0            TS       ADDRWD
 0156  REF    9 LAST  39         6157  50 020 0            INDEX    CYR
 0157  REF    5 LAST  38         6160  7 6234 0            7        INDJUMP -1         (THE INDEX MAKES THIS A TCF.)

 0158                            6161    00002 0            OCT      2                  REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
 0159                            6162    00006 1  REVCNT    OCT      6                  WORDS, SCALAR TAKES 6.
 0160                            6163    00006 1            OCT      6
 0161                            6164    00002 0  NO.WDS    OCT      2                  CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
 0162                            6165    00003 1            OCT      3                  2 IN DP, AND 3 IN TP.
 0163                            6166    00006 1            OCT      6
```

```
P0164             TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

 0166   REF  10 LAST  39          6167  10 020 1  OPJUMP2  CCS     CYR              TEST SECOND PREFIX BIT.
 0167   REF   1                   6170  1 6217 1           TCF     OPJUMP3          TEST THIRD BIT TO SEE IF UNARY OR SHIFT.

 0168                             6171   77722 0  -ENDVAC  DEC     -45

R0169             THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0171   IN THE RANGE 0 - 52, ERASABLE ADRES CONSTANTS FROM 100 - 1777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0173   IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

 0174   REF  12 LAST  38          6172  24 150 0  15BITADR INCR    LOC              (ENTRY HERE FROM STCALL).
 0175   REF  13 LAST  40          6173  50 150 0           INDEX   LOC              PICK UP ADDRESS WORD.
 0176                             6174  3 0000 1           CA      0
 0177   REF   5 LAST  10          6175  54 103 1           TS      POLISH           THE ABSOLUTE ADDRESS WILL BE LEFT IN
 0178   REF  11 LAST  39          6176  54 102 0           TS      ADDRWD           POLISH WITH AN ERASABLE SUBADDRESS IN
A0179                                                                               ADDRWD.
 0180   REF   2 LAST  38          6177  7 6231 0           MASK    HIGH9            SEE IF RELATIVE TO THE WORK AREA.
 0181   REF  11 LAST  39          6200  10 000 0           CCS     A
 0182                             6201  1 6203 1           TCF     +2
 0183   REF   1                   6202  1 6210 0           TCF     RELWORK          ONLY IF ZERO.

 0184   REF   1                   6203  3 6230 0           CAF     LOW7+2K          THESE INSTRUCTIONS ARE IN BANK 1.
 0185   REF  15 LAST  38          6204  54 004 1           TS      FBANK
 0186   REF  11 LAST  40          6205  7 0020 1           MASK    CYR
 0187   REF  12 LAST  40          6206  50 000 1           INDEX   A
 0188   REF   1                   6207  1 6275 0           TCF     MISCJUMP

 0189   REF   4 LAST  38          6210  3 0104 1  RELWORK  CA      FIXLOC           MAKE ADDRWD RELATIVE TO FIXLOC, LEAVING
 0190   REF  12 LAST  40          6211  26 102 0           ADS     ADDRWD           POLISH ABSOLUTE IN CASE THIS WAS AN
 0191   REF   2 LAST  40          6212  3 6230 0           CAF     LOW7+2K          AXT, ETC.
 0192   REF  16 LAST  40          6213  54 004 1           TS      FBANK
 0193   REF  12 LAST  40          6214  7 0020 1           MASK    CYR
 0194   REF  13 LAST  40          6215  50 000 1           INDEX   A
 0195   REF   2 LAST  40          6216  1 6275 0           TCF     MISCJUMP
```

```
P0196              COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

 0197   REF  17 LAST  40        6217  54 004 1  OPJUMP3   TS      FBANK          CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
 0198   REF  13 LAST  40        6220  10 020 1            CCS     CYR            TEST THIRD PREFIX BIT.
 0199   REF  14 LAST  40        6221  50 000 1            INDEX   A              THE DECREMENTED UNARY CODE IS IN BITS
 0200   REF   1                 6222  1 6315 1            TCF     UNAJUMP        1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

 0201   REF   4 LAST  39        6223  10 147 1            CCS     MODE           ITS A SHORT SHIFT CODE. SEE IF PRESENT
 0202   REF   1                 6224  1 2000 1            TCF     SHORTT         SCALAR OR VECTOR.
 0203   REF   2 LAST  41        6225  1 2000 1            TCF     SHORTT
 0204   REF   1                 6226  1 2102 1            TCF     SHORTV         CALLS THE APPROPRIATE ROUTINE.


 0205                           6227   00023 0  OCT23     OCT     23             MASK USED BY PUSH-UP ROUTINE.
 0206                           6230   02177 1  LOW7+2K   OCT     2177           OP CODE MASK + BANK 1 FBANK SETTING.
 0207                           6231   77700 0  HIGH9     OCT     77700
 0208                           6232   76000 0  BANKMASK  OCT     76000          FBANK MASK.
 0209   REF   3 LAST  38                  6232  FBANKMSK  EQUALS  BANKMASK
 0210                           6233   36000 1  B11T14    OCT     36000          USED IN PROCESSING STORE CODES.
 0211                           6234   76056 0  -ENDERAS  DEC     -977
```

```
P0212           THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

 0214   REF    1               6235  1 6511 0  INDJUMP  TCF     VLOAD          00 - LOAD MPAC WITH A VECTOR.
 0215   REF    1               6236  1 7050 1           TCF     TAD            01 - TRIPLE PRECISION ADD TO MPAC.
 0216   REF    1               6237  1 7603 1           TCF     SIGN           02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
 0217   REF    1               6240  1 7354 0           TCF     VXSC           03 - VECTOR TIMES SCALAR.
 0218   REF    1               6241  1 6672 0           TCF     CGOTO          04 - COMPUTED GO TO.
 0219   REF    1               6242  1 6474 1           TCF     TLOAD          05 - LOAD MPAC WITH TRIPLE PRECISION.
 0220   REF    1               6243  1 6465 1           TCF     DLOAD          06 - LOAD MPAC WITH A DP SCALAR.
 0221   REF    1               6244  1 7552 0           TCF     V/SC           07 - VECTOR DIVIDED BY SCALAR.

 0222   REF    1               6245  1 6505 0           TCF     SLOAD          10 - LOAD MPAC IN SINGLE PRECISION.
 0223   REF    1               6246  1 6624 0           TCF     SSP            11 - SET SINGLE PRECISION INTO X.
 0224   REF    1               6247  1 6527 0           TCF     PDDL           12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
 0225   REF    1               6250  1 7307 0           TCF     MXV            13 - MATRIX POST-MULTIPLIED BY VECTOR.
 0226   REF    1               6251  1 6563 0           TCF     PDVL           14 - PUSH DOWN AND VECTOR LOAD.
 0227   REF    1               6252  1 6632 1           TCF     CCALL          15 - COMPUTED CALL.
 0228   REF    1               6253  1 7312 1           TCF     VXM            16 - MATRIX PRE-MULTIPLIED BY VECTOR.
 0229   REF    1               6254  1 7544 1           TCF     TSLC           17 - NORMALIZE MPAC (SCALAR ONLY).

 0230   REF    1               6255  1 7522 1           TCF     DMPR           20 - DP MULTIPLY AND ROUND.
 0231   REF    1               6256  1 7525 0           TCF     DDV            21 - DP DIVIDE BY.
 0232   REF    1               6257  1 7531 0           TCF     BDDV           22 - DP DIVIDE INTO.
 0233   REF    1               6260  1 7547 1           TCF     GSHIFT         23 - GENERAL SHIFT INSTRUCTION.
 0234   REF    1               6261  1 6733 1           TCF     VAD            24 - VECTOR ADD.
 0235   REF    1               6262  1 6761 0           TCF     VSU            25 - VECTOR SUBTRACT.
 0236   REF    1               6263  1 7011 1           TCF     BVSU           26 - VECTOR SUBTRACT FROM.
 0237   REF    1               6264  1 7304 0           TCF     DOT            27 - VECTOR DOT PRODUCT.

 0238   REF    1               6265  1 7434 1           TCF     VXV            30 - VECTOR CROSS PRODUCT.
 0239   REF    1               6266  1 7400 0           TCF     VPROJ          31 - VECTOR PROJECTION.
 0240   REF    1               6267  1 6777 1           TCF     DSU            32 - DP SUBTRACT.
 0241   REF    1               6270  1 7035 1           TCF     BDSU           33 - DP SUBTRACT FROM.
 0242   REF    1               6271  1 6751 0           TCF     DAD            34 - DP ADD.
 0243                          6272  1 6272 1           TCF                    35 - AVAILABLE
 0244   REF    1               6273  1 7520 0           TCF     DMP1           36 - DP MULTIPLY.
 0245   REF    1               6274  1 7541 1           TCF     SETPD          37 - SET PUSH DOWN POINTER (DIRECT ONLY)

R0246   CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.
```

```
P0248                THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

 0250   REF    1                     6275  1 2000 1  MISCJUMP TCF     AXT             00 - ADDRESS TO INDEX TRUE.
 0251   REF    1                     6276  1 2005 1           TCF     AXC             01 - ADDRESS TO INDEX COMPLEMENTED.
 0252   REF    1                     6277  1 2010 0           TCF     LXA             02 - LOAD INDEX FROM ERASABLE.
 0253   REF    1                     6300  1 2014 1           TCF     LXC             03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
 0254   REF    1                     6301  1 2020 0           TCF     SXA             04 - STORE INDEX IN ERASABLE.
 0255   REF    1                     6302  1 2024 1           TCF     XCHX            05 - EXCHANGE INDEX WITH ERASABLE.
 0256   REF    1                     6303  1 2040 0           TCF     INCR            06 - INCREMENT INDEX REGISTER.
 0257   REF    1                     6304  1 2047 1           TCF     TIX             07 - TRANSFER ON INDEX.

 0258   REF    1                     6305  1 2032 0           TCF     XAD             10 - INDEX REGISTER ADD FROM ERASABLE.
 0259   REF    1                     6306  1 2043 0           TCF     XSU             11 - INDEX SUBTRACT FROM ERASABLE.
 0260   REF    1                     6307  1 2107 1           TCF     BZE/GOTO        12 - BRANCH ZERO AND GOTO.
 0261   REF    1                     6310  1 2114 0           TCF     BPL/BMN         13 - BRANCH PLUS AND BRANCH MINUS.
 0262   REF    1                     6311  1 2127 0           TCF     CALL/ITA        14 - CALL AND STORE QPRET.
 0263   REF    1                     6312  1 2067 0           TCF     RTB/BHIZ        15 - RETURN TO BASIC AND BRANCH HI ZERO.
 0264   REF    1                     6313  1 2135 0           TCF     SW/             16 - SWITCH INSTRUCTIONS AND AVAILABLE.
 0265   REF    1                     6314  1 2077 1           TCF     BOV(B)          17 - BRANCH ON OVERFLOW TO BASIC OR INT.
```

```
P0266             THE FOLLOWING JUMP TABLE APPIES TO UNARY INSTRUCTIONS.

A0267                                                                  00 - EXIT - DETECTED EARLIER.
 0268   REF    1                 6315  1 3135 1  UNAJUMP  TCF    SQRT       01 - SQUARE ROOT.
 0269   REF    1                 6316  1 3456 1           TCF    SINE       02 - SIN.
 0270   REF    1                 6317  1 3445 0           TCF    COSINE     03 - COS.
 0271   REF    1                 6320  1 3536 0           TCF    ARCSIN     04 - ARC SIN.
 0272   REF    1                 6321  1 3540 1           TCF    ARCCOS     05 - ARC COS.
 0273   REF    1                 6322  1 3122 1           TCF    DSQ        06 - DP SQUARE.
 0274   REF    1                 6323  1 2077 1           TCF    ROUND      07 - ROUND TO DP.

 0275   REF    1                 6324  1 7616 0           TCF    COMP       10 - COMPLEMENT VECTOR OR SCALAR.
 0276   REF    1                 6325  1 3160 1           TCF    VDEF       11 - VECTOR DEFINE.
 0277   REF    1                 6326  1 2750 0           TCF    UNIT       12 - UNIT VECTOR.
 0278   REF    1                 6327  1 3124 1           TCF    ABVALABS   13 - LENGTH OF VECTOR OR MAG OF SCALAR.
 0279   REF    1                 6330  1 3174 1           TCF    VSQ        14 - SQUARE OF LENGTH OF VECTOR.
 0280   REF    1                 6331  1 6334 1           TCF    STADR      15 - PUSH UP ON STORE CODE.
 0281   REF    1                 6332  1 3224 1           TCF    RVQ        16 - RETURN VIA QPRET.
 0282   REF    1                 6333  1 3177 1           TCF    PUSH       17 - PUSH MPAC DOWN.
```

```
P0283   SECTION 2  LOAD AND STORE PACKAGE.

R0284           A SET OF SIXTEEN STORE CODES ARE PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0286   ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0288   STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0290   FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0292           1. STORE            STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0294           2. STODL            STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (EITHER MAY BE INDEXED).
R0296           3. STOVL            STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0298           4. STCALL           STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0300           STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.


 0302   REF   5 LAST  35        6334  3 0151 1  STADR    CA      BANKSET         THE STADR CODE (PUSHUP UP ON STORE
 0303   REF  18 LAST  41        6335  54 004 1           TS      FBANK           ADDRESS) ENTERS HERE.
 0304   REF  14 LAST  40        6336  24 150 0           INCR    LOC
 0305   REF  15 LAST  45        6337  50 150 0           INDEX   LOC             THE STORE CODE WAS STORE COMPLEMENTED TO
 0306                           6340  4 0000 0           CS      0               MAKE IT LOOK LIKE AN OPCODE PAIR.
 0307   REF   1                 6341  6 7667 1           AD      NEGONE          (YUL CANT REMOVE 1 BECAUSE OF EARLY CCS)

 0308   REF  13 LAST  40        6342  54 102 0  DOSTORE  TS      ADDRWD
 0309   REF  10 LAST  38        6343  7 6426 0           MASK    LOW10           ENTRY FROM DISPATCHER. SAVE THE ERASABLE
 0310   REF  14 LAST  45        6344  56 102 1           XCH     ADDRWD          ADDRESS AND JUMP ON THE STORE CODE NO.
 0311   REF   1                 6345  7 6233 1           MASK    B11T14
 0312                           6346  0 0006 1           EXTEND
 0313   REF   1                 6347  7 7652 0           MP      BIT6            EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
 0314   REF  15 LAST  41        6350  50 000 1           INDEX   A
 0315   REF   1                 6351  1 6352 1           TCF     STORJUMP
```

```
P0316            STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0318    A SUPPLIED OPERATION CODE.

 0319    REF    1                   6352  0 6422 0  STORJUMP TC      STORE           STORE.
 0320    REF    2 LAST  34          6353  1 6022 0           TCF     NEWOPS -1       PICK UP NEW OP CODE(S).
 0321    REF    1                   6354  0 6414 0           TC      STORE,1
 0322    REF    3 LAST  46          6355  1 6022 0           TCF     NEWOPS -1
 0323    REF    1                   6356  0 6417 0           TC      STORE,2
 0324    REF    4 LAST  46          6357  1 6022 0           TCF     NEWOPS -1

 0325    REF    2 LAST  46          6360  0 6422 0           TC      STORE           STODL.
 0326    REF    1                   6361  1 6455 1           TCF     DODLOAD
 0327    REF    2 LAST  46          6362  0 6414 0           TC      STORE,1
 0328    REF    2 LAST  46          6363  1 6455 1           TCF     DODLOAD
 0329    REF    2 LAST  46          6364  0 6417 0           TC      STORE,2
 0330    REF    3 LAST  46          6365  1 6455 1           TCF     DODLOAD

 0331    REF    3 LAST  46          6366  0 6422 0           TC      STORE           STODL WITH INDEXED LOAD ADDRESS.
 0332    REF    1                   6367  1 6071 0           TCF     DODLOAD*
 0333    REF    3 LAST  46          6370  0 6414 0           TC      STORE,1
 0334    REF    2 LAST  46          6371  1 6071 0           TCF     DODLOAD*
 0335    REF    3 LAST  46          6372  0 6417 0           TC      STORE,2
 0336    REF    3 LAST  46          6373  1 6071 0           TCF     DODLOAD*

 0337    REF    4 LAST  46          6374  0 6422 0           TC      STORE           STOVL.
 0338    REF    1                   6375  1 6460 1           TCF     DOVLOAD
 0339    REF    4 LAST  46          6376  0 6414 0           TC      STORE,1
 0340    REF    2 LAST  46          6377  1 6460 1           TCF     DOVLOAD
 0341    REF    4 LAST  46          6400  0 6417 0           TC      STORE,2
 0342    REF    3 LAST  46          6401  1 6460 1           TCF     DOVLOAD

 0343    REF    5 LAST  46          6402  0 6422 0           TC      STORE           STOVL WITH INDEXED LOAD ADDRESS.
 0344    REF    1                   6403  1 6463 1           TCF     DOVLOAD*
 0345    REF    5 LAST  46          6404  0 6414 0           TC      STORE,1
 0346    REF    2 LAST  46          6405  1 6463 1           TCF     DOVLOAD*
 0347    REF    5 LAST  46          6406  0 6417 0           TC      STORE,2
 0348    REF    3 LAST  46          6407  1 6463 1           TCF     DOVLOAD*

 0349    REF    6 LAST  46          6410  0 6422 0           TC      STORE           STOTC.
 0350    REF    1                   6411  3 7674 0           CAF     CALLCODE
 0351    REF   14 LAST  41          6412 54 020 1            TS      CYR
 0352    REF    1                   6413  1 6172 1           TCF     15BITADR        GET A 15 BIT ADDRESS.
```

```
P0353              STORE CODE ADDRESS PROCESSOR.

 0354  REF    5 LAST  40         6414  50 104 1  STORE,1  INDEX   FIXLOC
 0355  REF    2 LAST  38         6415  4 0046 1           CS      X1
 0356  REF    1                  6416  1 6421 1           TCF     PRESTORE

 0357  REF    6 LAST  47         6417  50 104 1  STORE,2  INDEX   FIXLOC
 0358  REF    1                  6420  4 0047 0           CS      X2
 0359  REF   15 LAST  45         6421  26 102 0  PRESTORE ADS     ADDRWD          RESULTANT ADDRESS IS IN ERASABLE.

 0360  REF   16 LAST  47         6422  3 0102 1  STORE    CA      ADDRWD          SEE IF ADDRESS RELATIVE TO WORK AREA.
 0361  REF    2 LAST  37         6423  6 6171 0           AD      -ENDVAC
 0362  REF   16 LAST  45         6424  10 000 0           CCS     A
 0363  REF    1                  6425  1 6431 0           TCF     STARTSTO        ADDRESS OK AS IS.

 0364                            6426   01777 1  LOW10    OCT     1777

 0365  REF    7 LAST  47         6427  3 0104 1           CA      FIXLOC          GIVEN ADDRESS IS RELATIVE TO WORK AREA.
 0366  REF   17 LAST  47         6430  26 102 0           ADS     ADDRWD
```

```
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P0367           STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0368                                6431  0 0006 1  STARTSTO EXTEND                    MPAC,+1 MUST BE STORED IN ANY EVENT.
 0369   REF   1                      6432  3 0141 0           DCA     MPAC
 0370   REF  18 LAST  47             6433  50 102 1           INDEX   ADDRWD
 0371                                6434  52 001 1           DXCH    0

 0372   REF   5 LAST  41             6435  10 147 1           CCS     MODE
 0373   REF   1                      6436  1 6451 0           TCF     TSTORE
 0374   REF  24 LAST  33             6437  0 0002 0           TC      Q

 0375                                6440  0 0006 1  VSTORE   EXTEND
 0376   REF   2 LAST  48             6441  3 0144 0           DCA     MPAC +3
 0377   REF  19 LAST  48             6442  50 102 1           INDEX   ADDRWD
 0378                                6443  52 003 0           DXCH    2

 0379                                6444  0 0006 1           EXTEND
 0380   REF   3 LAST  48             6445  3 0146 1           DCA     MPAC +5
 0381   REF  20 LAST  48             6446  50 102 1           INDEX   ADDRWD
 0382                                6447  52 005 0           DXCH    4
 0383   REF  25 LAST  48             6450  0 0002 0           TC      Q

 0384   REF   4 LAST  48             6451  3 0142 0  TSTORE   CA      MPAC +2
 0385   REF  21 LAST  48             6452  50 102 1           INDEX   ADDRWD
 0386                                6453  54 002 1           TS      2
 0387   REF  26 LAST  48             6454  0 0002 0           TC      Q
```

```
P0388            ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE-TYPE CODES EXCEPT STORE
R0390     ITSELF.

 0391     REF    1                   6455   3 7675 1  DODLOAD   CAF      DLOADCOD
 0392     REF   15 LAST   46         6456   54 020 1            TS       CYR
 0393     REF    1                   6457   1 6041 0            TCF      DIRADRES          GO GET A DIRECT ADDRESS.

 0394     REF    1                   6460   3 7641 0  DOVLOAD   CAF      VLOADCOD
 0395     REF   16 LAST   49         6461   54 020 1            TS       CYR
 0396     REF    2 LAST   49         6462   1 6041 0            TCF      DIRADRES

 0397     REF    1                   6463   3 6042 1  DOVLOAD*  CAF      VLOAD*
 0398     REF    4 LAST   46         6464   1 6072 0            TCF      DODLOAD* +1       PROLOGUE TO INDEX ROUTINE.
```

```
P0399           THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

 0401                          6465   0 0006 1  DLOAD     EXTEND
 0402   REF  22 LAST  48       6466   5 0102 1            INDEX   ADDRWD
 0403                          6467   3 0001 0            DCA     0                PICK UP DP ARGUMENT AND LEAVE IT IN
 0404   REF   5 LAST  48       6470  52 141  1  SLOAD2    DXCH    MPAC             MPAC,+1, SETTING MPAC +2 TO ZERO. THE
 0405   REF   4 LAST  33       6471   3 7665 0            CAF     ZERO             CONTENTS OF THE OTHER FOUR REGISTERS OF
 0406   REF   6 LAST  50       6472  54 142  1            TS      MPAC +2          MPAC ARE IRRELEVANT.
 0407   REF   1                6473   1 6013 1            TCF     NEWMODE          DECLARE DOUBLE PRECISION MODE.

 0408   REF  23 LAST  50       6474  50 102  1  TLOAD     INDEX   ADDRWD
 0409                          6475   3 0002 0            CA      2                LOAD A TRIPLE PRECISION ARGUMENT INTO
 0410   REF   7 LAST  50       6476  54 142  1            TS      MPAC +2          THE FIRST THREE MPAC REGISTERS, WITH THE
 0411                          6477   0 0006 1            EXTEND                   CONTENTS OF THE OTHER FOUR IRRELEVANT.
 0412   REF  24 LAST  50       6500   5 0102 1            INDEX   ADDRWD
 0413                          6501   3 0001 0            DCA     0
 0414   REF   8 LAST  50       6502  52 141  1            DXCH    MPAC
 0415   REF   1                6503   3 7657 1            CAF     ONE
 0416   REF   2 LAST  50       6504   1 6013 1            TCF     NEWMODE          DECLARE TRIPLE PRECISION MODE.

 0417                          6505  22 007  0  SLOAD     ZL                       LOAD A SINGLE PRECISION NUMBER INTO
 0418   REF  25 LAST  50       6506  50 102  1            INDEX   ADDRWD           MPAC, SETTING MPAC+1,2 TO ZERO. THE
 0419                          6507   3 0000 1            CA      0                CONTENTS OF THE REMAINING MPAC REGISTERS
 0420   REF   1                6510   1 6470 0            TCF     SLOAD2           ARE IRRELEVANT.

 0421                          6511   0 0006 1  VLOAD     EXTEND                   LOAD A DOUBLE PRECISION VECTOR INTO
 0422   REF  26 LAST  50       6512   5 0102 1            INDEX   ADDRWD           MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
 0423                          6513   3 0001 0            DCA     0                CONTENTS OF MPAC +2 ARE IRRELEVANT.
 0424   REF   9 LAST  50       6514  52 141  1            DXCH    MPAC

 0425                          6515   0 0006 1  ENDVLOAD  EXTEND                   PDVL COMES HERE TO FINISH UP FOR DP, TP.
 0426   REF  27 LAST  50       6516   5 0102 1            INDEX   ADDRWD
 0427                          6517   3 0003 1            DCA     2
 0428   REF  10 LAST  50       6520  52 144  1            DXCH    MPAC +3

 0429                          6521   0 0006 1   +4       EXTEND                   TPDVL FINISHES HERE.
 0430   REF  28 LAST  50       6522   5 0102 1            INDEX   ADDRWD
 0431                          6523   3 0005 1            DCA     4
 0432   REF  11 LAST  50       6524  52 146  0            DXCH    MPAC +5

 0433   REF   2 LAST  50       6525   4 7657 0            CS      ONE              DECLARE VECTOR MODE.
 0434   REF   3 LAST  50       6526   1 6013 1            TCF     NEWMODE
```

```
P0435              THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0437              1.  PUSH               PUSHDOWN AND NO LOAD.
R0438              2.  PDDL               PUSHDOWN AND DOUBLE PRECISION LOAD.
R0439              3.  PDVL               PUSHDOWN AND VECTOR LOAD.

 0440                            6527  0 0006 1  PDDL      EXTEND
 0441    REF  29 LAST  50        6530  5 0102 1            INDEX   ADDRWD          LOAD MPAC,+1, PUSHING THE FORMER
 0442                            6531  3 0001 0            DCA     0               CONTENTS DOWN.
 0443    REF  12 LAST  50        6532  52 141 1            DXCH    MPAC
 0444    REF   2 LAST  39        6533  50 152 1            INDEX   PUSHLOC
 0445                            6534  52 001 1            DXCH    0

 0446    REF   6 LAST  48        6535  50 147 0            INDEX   MODE            ADVANCE THE PUSHDOWN POINTER APPRO-
 0447    REF   3 LAST  39        6536  3 6164 1            CAF     NO.WDS          PRIATELY.
 0448    REF   3 LAST  51        6537  26 152 0            ADS     PUSHLOC

 0449    REF   7 LAST  51        6540  10 147 1            CCS     MODE
 0450    REF   1                 6541  1 6556 0            TCF     ENDTPUSH
 0451    REF   1                 6542  1 6554 1            TCF     ENDDPUSH

 0452    REF   8 LAST  51        6543  54 147 1            TS      MODE            NOW DP.
 0453    REF  13 LAST  51        6544  54 142 1  ENDVPUSH  TS      MPAC +2
 0454    REF  14 LAST  51        6545  52 144 1            DXCH    MPAC +3         PUSH DOWN THE REST OF THE VECTOR HERE.
 0455    REF   4 LAST  51        6546  50 152 1            INDEX   PUSHLOC
 0456                            6547  51'775 0            DXCH    0 -4

 0457    REF  15 LAST  51        6550  52 146 0            DXCH    MPAC +5
 0458    REF   5 LAST  51        6551  50 152 1            INDEX   PUSHLOC
 0459                            6552  51'777 1            DXCH    0 -2

 0460    REF   1                 6553  1 6014 0            TCF     DANZIG

 0461    REF  16 LAST  51        6554  54 142 1  ENDDPUSH  TS      MPAC +2         SET MPAC +2 TO ZERO AND EXIT ON DP.
 0462    REF   2 LAST  51        6555  1 6014 0            TCF     DANZIG

 0463    REF   9 LAST  51        6556  54 147 1  ENDTPUSH  TS      MODE
 0464    REF  17 LAST  51        6557  56 142 0            XCH     MPAC +2         ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
 0465    REF   6 LAST  51        6560  50 152 1   +2       INDEX   PUSHLOC         DOWN THE OLD CONTENTS
 0466                            6561  53'777 0            TS      0 -1
 0467    REF   3 LAST  51        6562  1 6014 0            TCF     DANZIG
```

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L       LIST-PROCESSING INTERPRETER                                                    USER'S OWN PAGE NO.  19

P0468             PDVL - PUSHDOWN AND VECTOR LOAD.

 0469                                  6563  0 0006 1  PDVL      EXTEND                 RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
 0470   REF  30 LAST  51               6564  5 0102 1            INDEX    ADDRWD
 0471                                  6565  3 0001 0            DCA      0
 0472   REF  18 LAST  51               6566  52 141 1            DXCH     MPAC
 0473   REF   7 LAST  51               6567  50 152 1            INDEX    PUSHLOC
 0474                                  6570  52 001 1            DXCH     0

 0475   REF  10 LAST  51               6571  50 147 0            INDEX    MODE          ADVANCE THE PUSHDOWN POINTER.
 0476   REF   4 LAST  51               6572  3 6164 1            CAF      NO.WDS
 0477   REF   8 LAST  52               6573  26 152 0            ADS      PUSHLOC

 0478   REF  11 LAST  52               6574  10 147 1            CCS      MODE          TEST PAST MODE.
 0479   REF   1                        6575  1 6614 0            TCF      TPDVL
 0480   REF   1                        6576  1 6515 1            TCF      ENDVLOAD      JUST LOAD LAST FOUR REGISTERS ON DP.

 0481                                  6577  0 0006 1  VPDVL     EXTEND                 PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
 0482   REF  31 LAST  52               6600  5 0102 1            INDEX    ADDRWD
 0483                                  6601  3 0003 1            DCA      2
```

```
5'2600      MPC 2600 0000 1401 7734      7777 7777 7777 7777      0000 0000 0000 0113  SWS 2106 4431 0010 0041
5'2604       TS 2204 4075 0011 7542  SWE 2116 4071 0004 0000   WA 2515 0000 4406 0000  SWE 2516 0040 2004 0005
5'2610       WA 2515 0005 4406 0000   LA 2434 0005 4431 6007   WA 2715 0040 0142 0001       0000 0000 0000 0011
5'2614      SWS 2106 4406 0007 0001   TX 2420 1541 7777 4050   TS 2404 0041 4051 4026   WA 6215 4056 0143 4056
5'2620          0000 0000 0000 2000  SWS 6006 4052 0111 4052   EX 4016 4050 4052 4054   SS 4006 4431 4052 4050
5'2624       EX 4016 4053 4052 4055   NA 6014 4054 4055 6017   TX 2020 7777 7777 7777   BM 0713 1525 1303 0041
5'2630      TS, 7144 0474 5504 6342   EOI5240 0356 7351 3524   EOI5240 0356 7351 3524   EOI5240 0356 7351 3524
5'2634       EOI5240 0356 7351 3524   EOI5240 0356 7351 3524   EOI5240 0356 7351 3524   EOI5240 0356 7351 3524

           PRECEDING LINE IS REPEATED, UNTIL:

5'2674       EOI5240 0356 7351 3524   EOI5240 0356 7351 3524   EOI5240 0356 7351 3524       0300 7657 4017 7777
5'2700      MPC 2600 0000 1401 7734       0000 0000 0000 0000       0000 0000 0000 0000       2163 2043 2000 0001
5'2704          0000 0000 0400 0000       0000 0000 0200 0000       0000 0000 0013 5450       2163 2043 2000 0001
5'2710          0000 0000 0001 1432       0000 0000 0000 0000   TX 2420 0056 7777 6003   TX 2520 0004 7777 0002
5'2714      TS, 1344 4423 4073 6016  SWS 2006 4423 4013 4073   TX 2120 6006 7777 0015   TX 2120 4053 7777 0014
5'2720       TS 2204 4052 0011 7542   WD 6135 4427 4004 0016  NA, 5154 7001 6007 6027  NA, 4654 7001 6007 6027
5'2724      NA, 5054 7001 6007 6027   LA 6434 0016 4427 6031   TS 6004 7001 6010 6032   NA 6414 0156 4051 6022
5'2730       WD 2535 0016 4004 0016   TX 2420 0116 7777 7777   TX 6420 0056 7777 7001   TX 2120 6010 7777 0056
5'2734       LA 2034 4011 6003 6015   TX 2120 4427 7777 0016  NA, 1154 7000 6003 6041  NA, 1054 7000 4051 4060
5'2740      NA, 0654 7000 5400 6012   NA 2414 0156 4051 6036   TX 2020 4011 7777 4525  NA, 0654 6003 5000 6051
5'2744      TS, 1344 6003 5403 6437   TS 6004 6003 6007 6021   TS 2004 7000 4525 6050   LA 2434 0056 4051 6014
5'2750       TS 2204 7001 0156 6047   TS 2204 4427 0016 6053   LA 2434 0156 4051 6414  NA, 0654 7000 5000 6052
5'2754      TX, 1160 4051 7777 4501   TX 2020 4013 7777 6403   TX 2120 4427 7777 0016   LA 2434 0056 4051 6404
5'2760      NA, 0654 7000 5000 6070  NA, 1054 7000 4051 6063  TS, 1644 4016 4501 6070  NA, 0754 7000 4051 6067
5'2764      LA, 1374 6403 7000 6070   SS 0006 4521 4521 4501  TS, 1344 7000 6403 6070  LA, 1374 5010 7000 6071
5'2770       TS 2404 0116 7777 6057  TS, 1544 4015 4501 6070       0000 0000 0000 0000       0000 0000 0000 0000
5'2774          0000 0000 0000 0000       0000 0000 0000 0000       0402 2336 5155 1355       0300 7655 4012 7000
5'3000      MPC 2600 0000 1401 7734       0000 0000 0000 0000       0000 0000 0000 0000       0000 0000 0000 0001
5'3004      LA, 1174 4501 4051 6415   EX 0216 4501 0142 6007       7077 0000 0000 0000   NA 2014 6007 4521 6411
5'3010       TS 2404 0102 7777 6437  TS, 1344 5010 6403 6410  SWS 2006 4423 2013 4073   TS 2004 7777 7777 6016
```

```
 0484   REF  19 LAST  52        6602  52 144 1            DXCH    MPAC +3
 0485   REF   9 LAST  52        6603  50 152 1            INDEX   PUSHLOC
 0486                           6604  51'775 0            DXCH    0 -4

 0487                           6605  0 0006 1            EXTEND
 0488   REF  32 LAST  52        6606  5 0102 1            INDEX   ADDRWD
 0489                           6607  3 0005 1            DCA     4
 0490   REF  20 LAST  52        6610  52 146 0            DXCH    MPAC +5
 0491   REF  10 LAST  52        6611  50 152 1            INDEX   PUSHLOC
 0492                           6612  51'777 1            DXCH    0 -2

 0493   REF   4 LAST  51        6613  1 6014 0            TCF     DANZIG

 0494                           6614  0 0006 1  TPDVL     EXTEND                        ON TP, WE MUST LOAD THE Y COMPONENT
 0495   REF  33 LAST  52        6615  5 0102 1            INDEX   ADDRWD                BEFORE STORING MPAC +2 INCASE THIS IS A
 0496                           6616  3 0003 1            DCA     2                     PUSHUP.
 0497   REF  21 LAST  52        6617  52 144 1            DXCH    MPAC +3

 0498   REF  22 LAST  52        6620  3 0142 0            CA      MPAC +2
 0499   REF  11 LAST  52        6621  50 152 1            INDEX   PUSHLOC               IN DP.
 0500                           6622  53'777 0            TS      0 -1
 0501   REF   2 LAST  52        6623  1 6521 0            TCF     ENDVLOAD +4

R0502             SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

 0503   REF  16 LAST  45        6624  24 150 0  SSP       INCR    LOC                   PICK UP THE WORD FOLLOWING THE GIVEN
 0504   REF  17 LAST  52        6625  50 150 0            INDEX   LOC                   ADDRESS AND STORE IT AT X.
 0505                           6626  3 0000 1            CA      0
 0506   REF  34 LAST  52        6627  50 102 1  STORE1    INDEX   ADDRWD                SOME INDEX AND MISCELLANEOUS OPS END
 0507                           6630  54 000 0            TS      0                     HERE.
```

```
L        LIST-PROCESSING INTERPRETER                                   USER'S OWN PAGE NO.  20

 0508    REF    5 LAST  52         6631  1 6014 0          TCF      DANZIG
```

```
P0509    SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0510                THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES:

R0512                1.  GOTO                 GO TO.
R0513                2.  CALL                 CALL SUBROUTINE SETTING QPRET.
R0514                3.  CGOTO                COMPUTED GO TO.
R0515                4.  CCALL                COMPUTED CALL.
R0516                7.  BPL                  BRANCH IF MPAC POSITIVE OR ZERO.
R0517                8.  BZE                  BRANCH IF MPAC ZERO.
R0518                9.  BMN                  BRANCH IF MPAC NEGATIVE NON-ZERO.

 0519    REF  18 LAST  52          6632  24 150 0  CCALL     INCR    LOC             MAINTAIN LOC FOR QPRET COMPUTATION.
 0520    REF  19 LAST  54          6633  50 150 0            INDEX   LOC
 0521                              6634  3 0000 1            CAF     0               GET BASE ADDRESS OF CADR LIST.
 0522    REF  35 LAST  52          6635  50 102 1            INDEX   ADDRWD
 0523                              6636  6 0000 1            AD      0               ADD INCREMENT.
 0524    REF  19 LAST  45          6637  54 004 1            TS      FBANK           SELECT DESIRED CADR.
 0525    REF  11 LAST  45          6640  7 6426 0            MASK    LOW10
 0526    REF  17 LAST  47          6641  50 000 1            INDEX   A
 0527                              6642  3 2000 0            CAF     10000
 0528    REF   6 LAST  40          6643  54 103 1   -1       TS      POLISH

 0529    REF  12 LAST  54          6644  4 6426 0  CALL      CS      LOW10           FOR ANY OF THE CALL OPTIONS, MAKE UP THE
 0530    REF  20 LAST  54          6645  6 0150 0            AD      LOC             ADDRESS OF THE NEXT OP-CODE PAIR/STORE
 0531    REF   6 LAST  45          6646  6 0151 1            AD      BANKSET         CODE AND LEAVE IT IN QPRET. NOTE THAT
 0532    REF   8 LAST  47          6647  50 104 1            INDEX   FIXLOC          LOW10 = 2000 - 1.
 0533    REF   1                   6650  54 052 1            TS      QPRET

 0534    REF   7 LAST  54          6651  3 0103 0  GOTO      CA      POLISH          BASIC BRANCHING SEQUENCE.
 0535    REF  20 LAST  54          6652  54 004 1            TS      FBANK
 0536    REF  13 LAST  54          6653  7 6426 0            MASK    LOW10           MAKE UP 12 BIT SUB-ADDRESS AND FALL INTO
 0537    REF   3 LAST  38          6654  6 7645 1            AD      2K              FALL INTO THE INTPRET ENTRY UNLESS THE
 0538    REF  21 LAST  54          6655  54 150 1            TS      LOC             GIVEN ADDRESS WAS IN ERASABLE, IN WHICH
 0539    REF  21 LAST  54          6656  10 004 1            CCS     FBANK           CASE IT IS USED AS THE ADDRESS OF THE
 0540    REF   2 LAST  34          6657  1 6002 1            TCF     INTPRET +2      BRANCH ADDRESS.
 0541                              6660  1 6662 1            TCF     +2
 0542    REF   3 LAST  54          6661  1 6002 1            TCF     INTPRET +2
```

```
0543   REF  22 LAST  54      6662  4 0150 1            CS      LOC             THE GIVEN ADDRESS IS IN ERASABLE - SEE
0544   REF   1               6663  6 6710 1            AD      EVAC+2K         IF RELATIVE TO THE WORK AREA.
0545   REF  18 LAST  54      6664  10 000 0            CCS     A
0546   REF   9 LAST  54      6665  3 0104 1            CA      FIXLOC          ADD FIXLOC IF SO.
0547   REF  23 LAST  55      6666  26 150 1            ADS     LOC

0548   REF  24 LAST  55      6667  50 150 0            INDEX   LOC
0549                         6670  2'6000 0            CA      0 -2000         (ADDRESS HAD BEEN AUGMENTED BY 2000.)
0550   REF   1               6671  1 6652 1            TCF     GOTO +1         ALLOWS ARBITRARY INDIRECTNESS.

0551   REF  25 LAST  55      6672  50 150 0  CGOTO     INDEX   LOC             COMPUTED GO TO. PICK UP ADDRESS OF CADR
0552                         6673  3 0001 0            CA      1               LIST.
0553   REF  36 LAST  54      6674  50 102 1            INDEX   ADDRWD          ADD MODIFIER.
0554                         6675  6 0000 1            AD      0
0555   REF  22 LAST  54      6676  54 004 1            TS      FBANK           SELECT GOTO ADDRESS.
0556   REF  14 LAST  54      6677  7 6426 0            MASK    LOW10
0557   REF  19 LAST  55      6700  50 000 1            INDEX   A
0558                         6701  3 2000 0            CA      10000
0559   REF   2 LAST  55      6702  1 6652 1            TCF     GOTO +1         WITH ADDRESS IN A.

0560   REF   7 LAST  54      6703  3 0151 1  SWBRANCH  CA      BANKSET         SWITCH INSTRUCTIONS WHICH ELECT TO
0561   REF  23 LAST  55      6704  54 004 1            TS      FBANK           BRANCH COME HERE TO DO SO.
0562   REF  26 LAST  55      6705  50 150 0            INDEX   LOC
0563                         6706  3 0001 0            CA      1
0564   REF   3 LAST  55      6707  1 6652 1            TCF     GOTO +1

0565                         6710   02055 0  EVAC+2K   DEC     1069            =1024+45
```

```
L        LIST-PROCESSING INTERPRETER                                              USER'S OWN PAGE NO.  23

P0566               TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0568               L+1  IF MPAC IS GREATER THAN ZERO.
R0569               L+2  IF MPAC IS EQUAL TO +0 OR -0.
R0570               L+3  IF MPAC IS LESS THAN ZERO.


 0571   REF  23 LAST  52        6711  10 140 0  BRANCH    CCS     MPAC
 0572   REF  27 LAST  48        6712  0 0002 0            TC      Q
 0573                           6713  1 6715 0            TCF     +2                ON ZERO.
 0574   REF   1                 6714  1 6727 1            TCF     NEG

 0575   REF  24 LAST  56        6715  10 141 1            CCS     MPAC +1
 0576   REF  28 LAST  56        6716  0 0002 0            TC      Q
 0577                           6717  1 6721 1            TCF     +2
 0578   REF   2 LAST  56        6720  1 6727 1            TCF     NEG

 0579   REF  25 LAST  56        6721  10 142 1            CCS     MPAC +2
 0580   REF  29 LAST  56        6722  0 0002 0            TC      Q
 0581                           6723  1 6725 0            TCF     +2
 0582   REF   3 LAST  56        6724  1 6727 1            TCF     NEG

 0583   REF  30 LAST  56        6725  50 002 0            INDEX   Q                 IF ALL THREE REGISTERS WERE +-0.
 0584                           6726  0 0001 0            TC      1

 0585   REF  31 LAST  56        6727  50 002 0  NEG       INDEX   Q                 IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
 0586                           6730  0 0002 0            TC      2


 0587   REF  27 LAST  55        6731  50 150 0  EXIT      INDEX   LOC               LEAVE INTERPRETIVE MODE.
 0588                           6732  1 0001 1            TCF     1
```

```
P0589   SECTION 3 - ADD/SUBTRACT PACKAGE.

R0590           THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0592   MPAC:

R0593           1.  DAD             DOUBLE PRECISION ADD.
R0594           2.  DSU             DOUBLE PRECISION SUBTRACT.
R0595           3.  BDSU            DOUBLE PRECISION SUBTRACT FROM.

R0596           4.  TAD             TRIPLE PRECISION ADD.

R0597           5.  VAD             VECTOR ADD.
R0598           6.  VSU             VECTOR SUBTRACT.
R0599           7.  BVSU            VECTOR SUBTRACT FROM.

R0600   THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.


 0602                          6733  0 0006 1  VAD      EXTEND
 0603   REF  37 LAST  55       6734  5 0102 1           INDEX   ADDRWD
 0604                          6735  3 0003 1           DCA     2
 0605   REF  26 LAST  56       6736  20 144 1           DAS     MPAC +3
 0606                          6737  0 0006 1           EXTEND                   CHECK OVERFLOW.
 0607                          6740  1 6742 1           BZF     +2
 0608   REF   1                6741  0 7007 1           TC      OVERFLOW

 0609                          6742  0 0006 1           EXTEND
 0610   REF  38 LAST  57       6743  5 0102 1           INDEX   ADDRWD
 0611                          6744  3 0005 1           DCA     4
 0612   REF  27 LAST  57       6745  20 146 0           DAS     MPAC +5
 0613                          6746  0 0006 1           EXTEND
 0614                          6747  1 6751 0           BZF     +2
 0615   REF   2 LAST  57       6750  0 7007 1           TC      OVERFLOW

 0616                          6751  0 0006 1  DAD      EXTEND
 0617   REF  39 LAST  57       6752  5 0102 1           INDEX   ADDRWD
 0618                          6753  3 0001 0           DCA     0
 0619   REF  28 LAST  57       6754  20 141 1  ENDVXV   DAS     MPAC             VXV FINISHES HERE.
 0620                          6755  0 0006 1           EXTEND
 0621   REF   6 LAST  53       6756  1 6014 0           BZF     DANZIG
 0622   REF   3 LAST  57       6757  0 7007 1           TC      OVERFLOW
 0623   REF   7 LAST  57       6760  1 6014 0           TCF     DANZIG
```

```
0624                         6761  0 0006 1  VSU       EXTEND
0625   REF  40 LAST  57      6762  5 0102 1            INDEX    ADDRWD
0626                         6763  4 0003 0            DCS      2
0627   REF  29 LAST  57      6764  20 144 1            DAS      MPAC +3
0628                         6765  0 0006 1            EXTEND
0629                         6766  1 6770 0            BZF      +2
0630   REF   4 LAST  57      6767  0 7007 1            TC       OVERFLOW

0631                         6770  0 0006 1            EXTEND
0632   REF  41 LAST  58      6771  5 0102 1            INDEX    ADDRWD
0633                         6772  4 0005 0            DCS      4
0634   REF  30 LAST  58      6773  20 146 0            DAS      MPAC +5
0635                         6774  0 0006 1            EXTEND
0636                         6775  1 6777 1            BZF      +2
0637   REF   5 LAST  58      6776  0 7007 1            TC       OVERFLOW

0638                         6777  0 0006 1  DSU       EXTEND
0639   REF  42 LAST  58      7000  5 0102 1            INDEX    ADDRWD
0640                         7001  4 0001 1            DCS      0
0641   REF  31 LAST  58      7002  20 141 1            DAS      MPAC
0642                         7003  0 0006 1            EXTEND
0643   REF   8 LAST  57      7004  1 6014 0            BZF      DANZIG
0644   REF   6 LAST  58      7005  0 7007 1            TC       OVERFLOW
0645   REF   9 LAST  58      7006  1 6014 0            TCF      DANZIG

0646   REF   3 LAST  50      7007  3 7657 1  OVERFLOW  CAF      ONE           SUBROUTINE TO TURN OVFIND ON.
0647   REF   1               7010  1 7132 1            TCF      SETOVF2
```

```
0648                            7011  0 0006 1  BVSU     EXTEND
0649   REF  43 LAST  58         7012  5 0102 1           INDEX   ADDRWD
0650                            7013  3 0003 1           DCA     2
0651   REF  32 LAST  58         7014  52 144 1           DXCH    MPAC +3
0652                            7015  0 0006 1           EXTEND
0653                            7016  4 0001 1           DCOM
0654   REF  33 LAST  59         7017  20 144 1           DAS     MPAC +3
0655                            7020  0 0006 1           EXTEND
0656                            7021  1 7023 0           BZF     +2
0657   REF   7 LAST  58         7022  0 7007 1           TC      OVERFLOW

0658                            7023  0 0006 1           EXTEND
0659   REF  44 LAST  59         7024  5 0102 1           INDEX   ADDRWD
0660                            7025  3 0005 1           DCA     4
0661   REF  34 LAST  59         7026  52 146 0           DXCH    MPAC +5
0662                            7027  0 0006 1           EXTEND
0663                            7030  4 0001 1           DCOM
0664   REF  35 LAST  59         7031  20 146 0           DAS     MPAC +5
0665                            7032  0 0006 1           EXTEND
0666                            7033  1 7035 1           BZF     +2
0667   REF   8 LAST  59         7034  0 7007 1           TC      OVERFLOW

0668                            7035  0 0006 1  BDSU     EXTEND
0669   REF  45 LAST  59         7036  5 0102 1           INDEX   ADDRWD
0670                            7037  3 0001 0           DCA     0
0671   REF  36 LAST  59         7040  52 141 1           DXCH    MPAC
0672                            7041  0 0006 1           EXTEND
0673                            7042  4 0001 1           DCOM
0674   REF  37 LAST  59         7043  20 141 1           DAS     MPAC
0675                            7044  0 0006 1           EXTEND
0676   REF  10 LAST  58         7045  1 6014 0           BZF     DANZIG
0677   REF   9 LAST  59         7046  0 7007 1           TC      OVERFLOW
0678   REF  11 LAST  59         7047  1 6014 0           TCF     DANZIG
```

```
P0679              TRIPLE PRECISION ADD ROUTINE.

 0680                          7050  0 0006 1  TAD      EXTEND
 0681  REF  46 LAST  59        7051  5 0102 1           INDEX   ADDRWD
 0682                          7052  3 0002 0           DCA     1              ADD MINOR PARTS FIRST.
 0683  REF  38 LAST  59        7053  20 142 1           DAS     MPAC +1
 0684  REF  47 LAST  60        7054  50 102 1           INDEX   ADDRWD
 0685                          7055  6 0000 1           AD      0
 0686  REF  39 LAST  60        7056  6 0140 1           AD      MPAC
 0687  REF  40 LAST  60        7057  54 140 0           TS      MPAC
 0688  REF  12 LAST  59        7060  1 6014 0           TCF     DANZIG

 0689  REF   1                 7061  54 105 1  SETOVF   TS      OVFIND         SET OVFIND IF SUCH OCCURS.
 0690  REF  13 LAST  60        7062  1 6014 0           TCF     DANZIG
```

```
P0691   ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0692            1.  DMPSUB     DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC,+1 BY THE DP WORD WHOSE ADDRESS
R0694                           IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
R0696            2.  ROUNDSUB   ROUND THE TRIPLE PRECISON CONTENTS OF MPAC TO DOUBLE PRECISION.
R0698            3.  DOTSUB     TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
R0700                           AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
R0701            4.  POLY       USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
R0703                           COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)


 0705   REF  32 LAST  56        7063  50 002 0  DMP       INDEX   Q               BASIC SUBROUTINE FOR USE BY PINBALL, ETC
 0706                           7064  3 0000 1            CAF     0               ADRES OF ARGUMENT FOLLOWS  TC DMP  .
 0707   REF  33 LAST  61        7065  24 002 0            INCR    Q
 0708   REF  48 LAST  60        7066  54 102 0   -1       TS      ADDRWD          (PROLOGUE FOR SETTING ADDRWD.)

 0709   REF  49 LAST  61        7067  50 102 1  DMPSUB    INDEX   ADDRWD          GET MINOR PART OF OPERAND AT C(ADDRWD).
 0710                           7070  3 0001 0            CA      1
 0711   REF  41 LAST  60        7071  54 142 1            TS      MPAC +2         THIS WORKS FOR SQUARING MPAC AS WELL.
 0712   REF   5 LAST  50        7072  3 7665 0            CAF     ZERO            SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
 0713   REF  42 LAST  61        7073  56 141 0            XCH     MPAC +1         THE PARTIAL PRODUCTS WITH DAS
 0714   REF   4 LAST  30        7074  54 121 1            TS      MPTEMP          INSTRUCTIONS.
 0715                           7075  0 0006 1            EXTEND
 0716   REF  43 LAST  61        7076  7 0142 1            MP      MPAC +2         MINOR OF MPAC X MINOR OF C(ADDRWD).

 0717   REF  44 LAST  61        7077  56 142 0            XCH     MPAC +2         DISCARD MINOR PART OF ABOVE RESULT AND
 0718                           7100  0 0006 1            EXTEND                  FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
 0719   REF  45 LAST  61        7101  7 0140 0            MP      MPAC
 0720   REF  46 LAST  61        7102  20 142 1            DAS     MPAC +1         GUARANTEED NO OVERFLOW.

 0721   REF  50 LAST  61        7103  50 102 1            INDEX   ADDRWD          GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
 0722                           7104  3 0000 1            CA      0
 0723   REF   5 LAST  61        7105  56 121 0            XCH     MPTEMP          SAVE AND BRING OUT MINOR OF MPAC.
 0724                           7106  0 0006 1            EXTEND
 0725   REF   6 LAST  61        7107  7 0121 1            MP      MPTEMP          MAJOR OF C(ADDRWD) X MINOR OF MPAC.
 0726   REF  47 LAST  61        7110  20 142 1            DAS     MPAC +1         ACCUMULATE, SETTING A TO NET OVERFLOW.

 0727   REF  48 LAST  61        7111  56 140 1            XCH     MPAC            SETTING MPAC TO 0 OR +-1.
 0728                           7112  0 0006 1            EXTEND
 0729   REF   7 LAST  61        7113  7 0121 1            MP      MPTEMP          MAJOR OF MPAC X MAJOR OF C(ADDRWD).
 0730   REF  49 LAST  61        7114  20 141 1            DAS     MPAC            GUARANTEED NO OVERFLOW.
 0731   REF  34 LAST  61        7115  0 0002 0            TC      Q               49 MCT = .573 MS. INCLUDING RETURN.
```

```
P0732              ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

 0734   REF   6 LAST  61        7116  3 7665 0  ROUNDSUB CAF     ZERO            SET MPAC +2 = 0 FOR SCALARS AND CHANGE
 0735   REF  12 LAST  52        7117  54 147 1   +1      TS      MODE            MODE TO DP.

 0736   REF  50 LAST  61        7120  56 142 0  VROUND   XCH     MPAC +2         BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
 0737                           7121  6 0000 1           DOUBLE
 0738   REF   4 LAST  32        7122  54 001 1           TS      L
 0739   REF  35 LAST  61        7123  0 0002 0           TC      Q

 0740   REF  51 LAST  62        7124  6 0141 0           AD      MPAC +1         ADD ROUNDING BIT IF MPAC +2 WAS GREATER
 0741   REF  52 LAST  62        7125  54 141 1           TS      MPAC +1         THAN .5 IN MAGNITUDE.
 0742   REF  36 LAST  62        7126  0 0002 0           TC      Q

 0743   REF  53 LAST  62        7127  6 0140 1           AD      MPAC            PROPAGATE INTERFLOW.
 0744   REF  54 LAST  62        7130  54 140 0           TS      MPAC
 0745   REF  37 LAST  62        7131  0 0002 0           TC      Q

 0746   REF   2 LAST  60        7132  54 105 1  SETOVF2  TS      OVFIND          (RARE).
 0747   REF  38 LAST  62        7133  0 0002 0           TC      Q
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P0748           THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
R0750   REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
R0752   6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.


 0754   REF   2 LAST  28        7134  3 7656 0  PREDOT   CAF     TWO              PROLOGUE TO SET DOTINC TO 2.
 0755   REF   4 LAST  11        7135  54 122 1           TS      DOTINC

 0756                           7136  0 0006 1  DOTSUB   EXTEND
 0757   REF   5 LAST  11        7137  22 123 1           QXCH    DOTRET           SAVE RETURN.
 0758   REF   1                 7140  0 7067 1           TC      DMPSUB           DOT X COMPONENTS.
 0759   REF  55 LAST  62        7141  52 144 1           DXCH    MPAC +3          POSITION Y COMPONENT OF MPAC FOR
 0760   REF  56 LAST  63        7142  52 141 1           DXCH    MPAC             MULTIPLICATION WHILE SAVING RESULT IN
 0761   REF   4 LAST  11        7143  52 115 0           DXCH    BUF              THREE WORD BUFFER, BUF.
 0762   REF  57 LAST  63        7144  3 0142 0           CA      MPAC +2
 0763   REF   5 LAST  63        7145  54 116 0           TS      BUF +2

 0764   REF   5 LAST  63        7146  3 0122 0           CA      DOTINC           ADVANCE ADDRWD TO Y COMPONENT OF
 0765   REF  51 LAST  61        7147  26 102 0           ADS     ADDRWD           OTHER ARGUMENT.
 0766   REF   2 LAST  63        7150  0 7067 1           TC      DMPSUB
 0767   REF  58 LAST  63        7151  52 142 1           DXCH    MPAC +1          ACCUMULATE PARTIAL PRODUCTS.
 0768   REF   6 LAST  63        7152  20 116 0           DAS     BUF +1
 0769   REF  59 LAST  63        7153  6 0140 1           AD      MPAC
 0770   REF   7 LAST  63        7154  6 0114 0           AD      BUF
 0771   REF   8 LAST  63        7155  54 114 1           TS      BUF
 0772                           7156  1 7160 0           TCF     +2
 0773   REF   3 LAST  62        7157  54 105 1           TS      OVFIND           IF OVERFLOW OCCURS.

 0774   REF  60 LAST  63        7160  52 146 0           DXCH    MPAC +5          MULTIPLY Z COMPONENTS.
 0775   REF  61 LAST  63        7161  52 141 1           DXCH    MPAC
 0776   REF   6 LAST  63        7162  3 0122 0           CA      DOTINC
 0777   REF  52 LAST  63        7163  26 102 0           ADS     ADDRWD
 0778   REF   3 LAST  63        7164  0 7067 1           TC      DMPSUB
 0779   REF   9 LAST  63        7165  52 116 0  ENDDOT   DXCH    BUF +1           LEAVE FINAL ACCUMULATION IN MPAC.
 0780   REF  62 LAST  63        7166  20 142 1           DAS     MPAC +1
 0781   REF  63 LAST  63        7167  6 0140 1           AD      MPAC
 0782   REF  10 LAST  63        7170  6 0114 0           AD      BUF
 0783   REF  64 LAST  63        7171  54 140 0           TS      MPAC
 0784   REF   6 LAST  63        7172  0 0123 1           TC      DOTRET

 0785   REF   4 LAST  63        7173  54 105 1           TS      OVFIND           ON OVERFLOW HERE.
 0786   REF   7 LAST  63        7174  0 0123 1           TC      DOTRET
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P0787   DOUBLE PRECISION POLYNOMIAL EVALUATOR

R0788                                   N          N-1
R0789           THIS ROUTINE EVALUATES A X   + A    X      + ... + A X + A   LEAVING THE DP RESULT IN MPAC ON EXIT.
R0791                                  N     N-1                 1     0

R0792   THE ROUTINE HAS TWO ENTRIES

R0793           1. ENTRY THRU POWRSERS, THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE, THE CALL IS BY
R0795              TC POWRSERS, AND THE RETURN IS TO LOC(TC POWRSERS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

A0797                                             A          SP     LOC-3              ADDRESS FOR REFERENCING COEF TABLE
A0798                                             L          SP     N-1                N IS THE DEGREE OF THE POWER SERIES
A0799                                             MPAC       DP     X                  ARGUMENT

A0800                                             LOC-2N     DP     A(0)
A0801                                                        ...
A0802                                             LOC        DP     A(N)

R0803           2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

A0805                                             MPAC       DP     X                  ARGUMENT

A0806                                             LOC        TC     POLY
A0807                                             LOC+1      SP     N-1
A0808                                             LOC+2      DP     A(0)
A0809                                                        ...
A0810                                             LOC+2N+2   DP     A(N)               RETURN IS TO LOC+2N+4

 0811                           7175   0 0006 1   POWRSERS   EXTEND
 0812   REF    1                7176  22 125  1              QXCH   POLYRET            RETURN ADDRESS
 0813   REF    8 LAST   54      7177  54 103  1              TS     POLISH             POWER SERIES ADDRESS
 0814   REF    1                7200  22 124  0              LXCH   POLYCNT            N-1 TO COUNTER
 0815   REF    1                7201   1 7212 0              TCF    POLYCOM            SKIP SET UP BY POLY

 0816   REF   39 LAST   62      7202  50 002  0   POLY       INDEX  Q
 0817                           7203   3 0000 1              CAF    0
 0818   REF    2 LAST   64      7204  54 124  1              TS     POLYCNT            N-1 TO COUNTER
 0819                           7205   6 0000 1              DOUBLE
 0820   REF   40 LAST   64      7206   6 0002 0              AD     Q
 0821   REF    9 LAST   64      7207  54 103  1              TS     POLISH             L(A(N))-3 TO POLISH
 0822   REF    1                7210   6 7664 1              AD     FIVE
 0823   REF    2 LAST   64      7211  54 125  0              TS     POLYRET            STORE RETURN ADDRESS

 0824   REF    1                7212   3 7677 0   POLYCOM    CAF    LVBUF              INCOMING X WILL BE MOVED TO VBUF, SO
 0825   REF   53 LAST   63      7213  54 102  0              TS     ADDRWD             SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0826                           7214   0 0006 1              EXTEND
 0827   REF   10 LAST   64      7215   5 0103 0              INDEX  POLISH
 0828                           7216   3 0004 0              DCA    3
```

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L       LIST-PROCESSING INTERPRETER                                                           USER'S OWN PAGE NO.  32

 0829   REF  65 LAST  63       7217  52 141 1            DXCH   MPAC            LOAD A(N) INTO MPAC,
 0830   REF  12 LAST  11       7220  52 107 0            DXCH   VBUF            SAVING X IN VBUF
 0831   REF   1                7221   1 7225 1           TCF    POLY2

 0832   REF   3 LAST  64       7222  54 124 1  POLYLOOP  TS     POLYCNT         SAVE DECREMENTED LOOP COUNTER
 0833   REF   3 LAST  63       7223   4 7656 1           CS     TWO
 0834   REF  11 LAST  64       7224  26 103 1            ADS    POLISH          REGRESS COEFFICIENT POINTER

 0835   REF   4 LAST  63       7225   0 7067 1  POLY2     TC     DMPSUB          MULTIPLY BY X
 0836                          7226   0 0006 1           EXTEND
 0837   REF  12 LAST  65       7227   5 0103 0           INDEX  POLISH
 0838                          7230   3 0002 0           DCA    1               ADD IN NEXT COEFFICIENT
 0839   REF  66 LAST  65       7231  20 141 1            DAS    MPAC            USERS RESPONSIBILITY TO ASSURE NO OVFLOW

 0840   REF   4 LAST  65       7232  10 124 1            CCS    POLYCNT
 0841   REF   1                7233   1 7222 0           TCF    POLYLOOP
 0842   REF   3 LAST  64       7234   0 0125 1           TC     POLYRET         RETURN CALLER
```

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P0843              MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

 0845                              7235  0 0006 1  TPAGREE   EXTEND                   FORCE SIGN AGREEMENT AMONG THE TRIPLE-
 0846   REF  11 LAST  63           7236  22 114 0            QXCH     BUF             PRECISION CONTENTS OF MPAC, RETURNING
 0847   REF   1                    7237  0 6711 0            TC       BRANCH          WITH THE SIGNUM OF THE INPUT IN A.
 0848   REF   1                    7240  1 7244 0            TCF      ARG+
 0849   REF   1                    7241  1 7264 1            TCF      ARGZERO

 0850   REF   1                    7242  4 7637 0            CS       POSMAX          IF NEGATIVE.
 0851                              7243  1 7245 1            TCF      +2

 0852   REF   2 LAST  66           7244  3 7637 1  ARG+      CAF      POSMAX
 0853   REF  12 LAST  66           7245  54 115 0   +2       TS       BUF +1
 0854                              7246  0 0006 1            EXTEND
 0855   REF  20 LAST  55           7247  24 000 1            AUG      A               FORMS +-1.0.
 0856   REF  67 LAST  65           7250  6 0142 0            AD       MPAC +2
 0857   REF  68 LAST  66           7251  54 142 1            TS       MPAC +2
 0858   REF   7 LAST  62           7252  3 7665 0            CAF      ZERO
 0859   REF  13 LAST  66           7253  6 0115 1            AD       BUF +1
 0860   REF  69 LAST  66           7254  6 0141 0            AD       MPAC +1
 0861   REF  70 LAST  66           7255  54 141 1            TS       MPAC +1
 0862   REF   8 LAST  66           7256  3 7665 0            CAF      ZERO
 0863   REF  14 LAST  66           7257  6 0115 1            AD       BUF +1
 0864   REF  71 LAST  66           7260  6 0140 1            AD       MPAC
 0865   REF  72 LAST  66           7261  54 140 0  ARGZERO2  TS       MPAC            ALWAYS SKIPPING UNLESS ARGZERO.
 0866   REF  73 LAST  66           7262  54 141 1            TS       MPAC +1
 0867   REF  15 LAST  66           7263  0 0114 0            TC       BUF             RETURN.

 0868   REF  74 LAST  66           7264  54 142 1  ARGZERO   TS       MPAC +2         SET ALL THREE MPAC REGISTERS TO ZERO.
 0869   REF   1                    7265  1 7261 1            TCF      ARGZERO2

R0870              SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

 0872   REF   8 LAST  61           7266  54 121 1  SHORTMP   TS       MPTEMP
 0873                              7267  0 0006 1            EXTEND
 0874   REF  75 LAST  66           7270  7 0142 1            MP       MPAC +2
 0875   REF  76 LAST  66           7271  54 142 1            TS       MPAC +2
 0876   REF   9 LAST  66           7272  3 7665 0            CAF      ZERO            SO SUBSEQUENT DAS WILL WORK.
 0877   REF  77 LAST  66           7273  56 141 0            XCH      MPAC +1
 0878                              7274  0 0006 1            EXTEND
 0879   REF   9 LAST  66           7275  7 0121 1            MP       MPTEMP
 0880   REF  78 LAST  66           7276  20 142 1            DAS      MPAC +1
 0881   REF  79 LAST  66           7277  56 140 1            XCH      MPAC            SETTING MPAC TO 0.
 0882                              7300  0 0006 1            EXTEND
 0883   REF  10 LAST  66           7301  7 0121 1            MP       MPTEMP
 0884   REF  80 LAST  66           7302  20 141 1            DAS      MPAC
 0885   REF  41 LAST  64           7303  0 0002 0            TC       Q
```

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P0886   MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0887            1.  DOT              DP VECTOR DOT PRODUCT.
R0888            2.  VXV              DP VECTOR CROSS PRODUCT.
R0889            3.  VXSC             DP VECTOR TIMES SCALAR.
R0890            4.  V/SC             DP VECTOR DIVIDED BY SCALAR.
R0891            5.  VPROJ            DP VECTOR PROJECTION. ( (MPAC.X)MPAC ).
R0892            6.  VXM              DP VECTOR POST-MULTIPLIED BY MATRIX.
R0893            7.  MXV              DP VECTOR PRE-MULTIPLIED BY MATRIX.


 0894   REF   1               7304  0 7134 0  DOT     TC      PREDOT          DO THE DOT PRODUCT AND EXIT, CHANGING
 0895   REF  10 LAST  66      7305  3 7665 0          CAF     ZERO            THE MODE TO DP SCALAR.
 0896   REF   4 LAST  50      7306  1 6013 1          TCF     NEWMODE


 0897   REF   4 LAST  65      7307  3 7656 0  MXV     CAF     TWO             SET UP MATINC AND DOTINC FOR ROW
 0898   REF   5 LAST  11      7310  54 124 1          TS      MATINC          VECTORS.
 0899   REF   1               7311  1 7315 0          TCF     VXM/MXV         GO TO COMMON PORTION.

 0900   REF   1               7312  4 7661 0  VXM     CS      TEN             SET MATINC AND DOTINC TO REFER TO MATRIX
 0901   REF   6 LAST  67      7313  54 124 1          TS      MATINC          AS THREE COLUMN VECTORS.
 0902   REF   1               7314  3 6162 1          CAF     SIX
```

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P0903           COMMON PORTION OF MXV AND VXM.

 0904   REF   7 LAST  63         7315  54 122 1  VXM/MXV  TS      DOTINC
 0905   REF   1                  7316  0 7506 0           TC      MPACVBUF           SAVE VECTOR IN MPAC FOR FURTHER USE.

 0906   REF   1                  7317  0 7136 1           TC      DOTSUB             GO DOT TO GET X COMPONENT OF ANSWER.
 0907                            7320  0 0006 1           EXTEND
 0908   REF  13 LAST  65         7321  3 0107 1           DCA     VBUF               MOVE MPAC VECTOR BACK INTO MPAC, SAVING
 0909   REF  81 LAST  66         7322  52 141 1           DXCH    MPAC               NEW X COMPONENT IN BUF2.
 0910   REF   8 LAST  30         7323  52 120 0           DXCH    BUF2
 0911                            7324  0 0006 1           EXTEND
 0912   REF  14 LAST  68         7325  3 0111 0           DCA     VBUF +2
 0913   REF  82 LAST  68         7326  52 144 1           DXCH    MPAC +3
 0914                            7327  0 0006 1           EXTEND
 0915   REF  15 LAST  68         7330  3 0113 1           DCA     VBUF +4
 0916   REF  83 LAST  68         7331  52 146 0           DXCH    MPAC +5
 0917   REF   7 LAST  67         7332  3 0124 0           CA      MATINC             INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
 0918   REF  54 LAST  64         7333  26 102 0           ADS     ADDRWD             FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

 0919   REF   2 LAST  68         7334  0 7136 1           TC      DOTSUB
 0920   REF  16 LAST  68         7335  52 107 0           DXCH    VBUF               MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
 0921   REF  84 LAST  68         7336  52 141 1           DXCH    MPAC               COMPONENT OF ANSWER IN VBUF +2.
 0922   REF  17 LAST  68         7337  52 111 1           DXCH    VBUF +2
 0923   REF  85 LAST  68         7340  52 144 1           DXCH    MPAC +3
 0924   REF  18 LAST  68         7341  52 113 0           DXCH    VBUF +4
 0925   REF  86 LAST  68         7342  52 146 0           DXCH    MPAC +5
 0926   REF   8 LAST  68         7343  3 0124 0           CA      MATINC             FORM ADDRESS OF LAST COLUMN OR ROW.
 0927   REF  55 LAST  68         7344  26 102 0           ADS     ADDRWD

 0928   REF   3 LAST  68         7345  0 7136 1           TC      DOTSUB
 0929   REF   9 LAST  68         7346  52 120 0           DXCH    BUF2               ANSWER NOW COMPLETE. PUT COMPONENTS INTO
 0930   REF  87 LAST  68         7347  52 141 1           DXCH    MPAC               PROPER MPAC REGISTERS.
 0931   REF  88 LAST  68         7350  52 146 0           DXCH    MPAC +5
 0932   REF  19 LAST  68         7351  52 111 1           DXCH    VBUF +2
 0933   REF  89 LAST  68         7352  52 144 1           DXCH    MPAC +3
 0934   REF  14 LAST  60         7353  1 6014 0           TCF     DANZIG             EXIT.
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P0935              VXSC - VECTOR TIMES SCALAR.

 0936   REF  13 LAST  62          7354  10 147 1  VXSC      CCS      MODE             TEST PRESENT MODE.
 0937   REF   1                   7355   1 7403 0           TCF      DVXSC            SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
 0938   REF   2 LAST  69          7356   1 7403 0           TCF      DVXSC

 0939   REF   5 LAST  65          7357   0 7067 1  VVXSC     TC       DMPSUB           COMPUTE X COMPONENT
 0940   REF   1                   7360   0 7120 0           TC       VROUND           AND ROUND IT.
 0941   REF  90 LAST  68          7361  52 144 1            DXCH     MPAC +3          PUT Y COMPONENT INTO MPAC SAVING MPAC IN
 0942   REF  91 LAST  69          7362  52 141 1            DXCH     MPAC             MPAC +3.
 0943   REF  92 LAST  69          7363  52 144 1            DXCH     MPAC +3

 0944   REF   6 LAST  69          7364   0 7067 1           TC       DMPSUB           DO SAME FOR Y AND Z COMPONENTS.
 0945   REF   2 LAST  69          7365   0 7120 0           TC       VROUND
 0946   REF  93 LAST  69          7366  52 146 0            DXCH     MPAC +5
 0947   REF  94 LAST  69          7367  52 141 1            DXCH     MPAC
 0948   REF  95 LAST  69          7370  52 146 0            DXCH     MPAC +5

 0949   REF   7 LAST  69          7371   0 7067 1           TC       DMPSUB
 0950   REF   3 LAST  69          7372   0 7120 0           TC       VROUND
 0951   REF  96 LAST  69          7373  52 141 1  VROTATEX  DXCH     MPAC             EXIT USED TO RESTORE MPAC AFTER THIS
 0952   REF  97 LAST  69          7374  52 146 0            DXCH     MPAC +5          TYPE OF ROTATION. CALLED BY VECTOR SHIFT
 0953   REF  98 LAST  69          7375  52 144 1            DXCH     MPAC +3          RIGHT, V/SC, ETC.
 0954   REF  99 LAST  69          7376  52 141 1            DXCH     MPAC
 0955   REF  15 LAST  68          7377   1 6014 0           TCF      DANZIG
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P0956          DP VECTOR PROJECTION ROUTINE.
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 0957   REF    2 LAST  67        7400  0 7134 0  VPROJ    TC      PREDOT        (MPAC.X)MPAC IS COMPUTED AND LEFT IN
 0958   REF    1                 7401  4 7655 1           CS      FOUR          MPAC. DO DOT AND FALL INTO DVXSC.
 0959   REF   56 LAST  68        7402  26 102 0           ADS     ADDRWD

R0960          VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

 0961                            7403  0 0006 1  DVXSC    EXTEND                SAVE SCALAR IN MPAC +3 AND GET X
 0962   REF  100 LAST  69        7404  3 0141 0           DCA     MPAC          COMPONENT OF ANSWER.
 0963   REF  101 LAST  70        7405  52 144 1           DXCH    MPAC +3
 0964   REF    8 LAST  69        7406  0 7067 1           TC      DMPSUB
 0965   REF    4 LAST  69        7407  0 7120 0           TC      VROUND

 0966   REF    5 LAST  67        7410  3 7656 0           CAF     TWO           ADVANCE ADDRWD TO Y COMPONENT OF X.
 0967   REF   57 LAST  70        7411  26 102 0           ADS     ADDRWD
 0968                            7412  0 0006 1           EXTEND
 0969   REF  102 LAST  70        7413  3 0144 0           DCA     MPAC +3       PUT SCALAR BACK INTO MPAC AND SAVE
 0970   REF  103 LAST  70        7414  52 141 1           DXCH    MPAC          X RESULT IN MPAC +5.
 0971   REF  104 LAST  70        7415  52 146 0           DXCH    MPAC +5
 0972   REF    9 LAST  70        7416  0 7067 1           TC      DMPSUB
 0973   REF    5 LAST  70        7417  0 7120 0           TC      VROUND

 0974   REF    6 LAST  70        7420  3 7656 0           CAF     TWO
 0975   REF   58 LAST  70        7421  26 102 0           ADS     ADDRWD        TO Z COMPONENT.
 0976   REF  105 LAST  70        7422  52 144 1           DXCH    MPAC +3       BRING SCALAR BACK, PUTTING Y RESULT IN
 0977   REF  106 LAST  70        7423  52 141 1           DXCH    MPAC          THE PROPER PLACE.
 0978   REF  107 LAST  70        7424  52 144 1           DXCH    MPAC +3
 0979   REF   10 LAST  70        7425  0 7067 1           TC      DMPSUB
 0980   REF    6 LAST  70        7426  0 7120 0           TC      VROUND

 0981   REF  108 LAST  70        7427  52 141 1           DXCH    MPAC          PUT Z COMPONENT IN PROPER PLACE, ALSO
 0982   REF  109 LAST  70        7430  52 146 0           DXCH    MPAC +5       POSITIONING X.
 0983   REF  110 LAST  70        7431  52 141 1           DXCH    MPAC

 0984   REF    4 LAST  58        7432  4 7657 0           CS      ONE           MODE HAS CHANGED TO VECTOR.
 0985   REF    5 LAST  67        7433  1 6013 1           TCF     NEWMODE
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P0986            THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M ,X M -X M ,X M -X M ) WHERE M IS THE VECTOR IN
R0988                                                          3 2  2 3  1 3  3 1  2 1  1 2
R0990   MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.


 0991                              7434  0 0006 1  VXV     EXTEND
 0992   REF 111 LAST  70           7435  3 0146 1          DCA      MPAC +5          FORM UP M3X1, LEAVING M1 IN VBUF.
 0993   REF 112 LAST  71           7436  52 141 1          DXCH     MPAC
 0994   REF  20 LAST  68           7437  52 107 0          DXCH     VBUF
 0995   REF  11 LAST  70           7440  0 7067 1          TC       DMPSUB           BY X1.

 0996                              7441  0 0006 1          EXTEND
 0997   REF 113 LAST  71           7442  4 0144 1          DCS      MPAC +3          CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
 0998   REF 114 LAST  71           7443  52 141 1          DXCH     MPAC
 0999   REF  21 LAST  71           7444  52 111 1          DXCH     VBUF +2
 1000   REF  12 LAST  71           7445  0 7067 1          TC       DMPSUB

 1001   REF   7 LAST  70           7446  3 7656 0          CAF      TWO              ADVANCE ADDRWD TO X2.
 1002   REF  59 LAST  70           7447  26 102 0          ADS      ADDRWD
 1003                              7450  0 0006 1          EXTEND
 1004   REF 115 LAST  71           7451  4 0146 0          DCS      MPAC +5          PREPARE TO GET -X2M3, SAVING -X1M2 IN
 1005   REF 116 LAST  71           7452  52 141 1          DXCH     MPAC             MPAC +5.
 1006   REF 117 LAST  71           7453  52 146 0          DXCH     MPAC +5
 1007   REF  13 LAST  71           7454  0 7067 1          TC       DMPSUB

 1008                              7455  0 0006 1          EXTEND
 1009   REF  22 LAST  71           7456  3 0107 1          DCA      VBUF             GET X2M1, SAVING -X2M3 IN VBUF +4.
 1010   REF 118 LAST  71           7457  52 141 1          DXCH     MPAC
 1011   REF  23 LAST  71           7460  52 113 0          DXCH     VBUF +4
 1012   REF  14 LAST  71           7461  0 7067 1          TC       DMPSUB

 1013   REF   8 LAST  71           7462  3 7656 0          CAF      TWO              ADVANCE ADDRWD TO X3.
 1014   REF  60 LAST  71           7463  26 102 0          ADS      ADDRWD
 1015                              7464  0 0006 1          EXTEND
 1016   REF  24 LAST  71           7465  4 0107 0          DCS      VBUF             GET -X3M1, ADDING X2M1 TO MPAC +5 TO
 1017   REF 119 LAST  71           7466  52 141 1          DXCH     MPAC             COMPLETE THE Z COMPONENT OF THE ANSWER.
 1018   REF 120 LAST  71           7467  20 146 0          DAS      MPAC +5

 1019                              7470  0 0006 1          EXTEND
 1020                              7471  1 7473 1          BZF      +2
 1021   REF  10 LAST  59           7472  0 7007 1          TC       OVERFLOW
 1022   REF  15 LAST  71      7473  0 7067 1            TC      DMPSUB
 1023   REF  25 LAST  71      7474  52 111 1            DXCH    VBUF +2         MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
 1024   REF 121 LAST  71      7475  52 144 1            DXCH    MPAC +3         AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
 1025   REF 122 LAST  72      7476  52 141 1            DXCH    MPAC            Y COMPONENT OF THE RESULT.
 1026   REF 123 LAST  72      7477  20 144 1            DAS     MPAC +3

 1027                         7500  0 0006 1            EXTEND
 1028                         7501  1 7503 1            BZF     +2
 1029   REF  11 LAST  71      7502  0 7007 1            TC      OVERFLOW

 1030   REF  16 LAST  72      7503  0 7067 1            TC      DMPSUB
 1031   REF  26 LAST  72      7504  52 113 0            DXCH    VBUF +4         GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
 1032   REF   1               7505  1 6754 0            TCF     ENDVXV          COMPONENT (TAIL END OF DAD).

R1033            THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

 1035                         7506  0 0006 1  MPACVBUF  EXTEND                  CALLED BY MXV, VXM, AND UNIT.
 1036   REF 124 LAST  72      7507  3 0141 0            DCA     MPAC
 1037   REF  27 LAST  72      7510  52 107 0            DXCH    VBUF
 1038                         7511  0 0006 1            EXTEND
 1039   REF 125 LAST  72      7512  3 0144 0            DCA     MPAC +3
 1040   REF  28 LAST  72      7513  52 111 1            DXCH    VBUF +2
 1041                         7514  0 0006 1            EXTEND
 1042   REF 126 LAST  72      7515  3 0146 1            DCA     MPAC +5
 1043   REF  29 LAST  72      7516  52 113 0            DXCH    VBUF +4
 1044   REF  42 LAST  66      7517  0 0002 0            TC      Q               RETURN TO CALLER.
```

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P1045             INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

 1047    REF  17 LAST  72          7520  0 7067 1  DMP1      TC       DMPSUB               DMP INSTRUCTION.
 1048    REF  16 LAST  69          7521  1 6014 0            TCF      DANZIG

 1049    REF  18 LAST  73          7522  0 7067 1  DMPR      TC       DMPSUB
 1050    REF   1                   7523  0 7117 1            TC       ROUNDSUB +1          (C(A) = +0).
 1051    REF  17 LAST  73          7524  1 6014 0            TCF      DANZIG

 1052                              7525  0 0006 1  DDV       EXTEND
 1053    REF  61 LAST  71          7526  5 0102 1            INDEX    ADDRWD               MOVE DIVIDEND INTO BUF.
 1054                              7527  3 0001 0            DCA      0
 1055    REF   2 LAST  42          7530  1 7535 1            TCF      BDDV +4

 1056                              7531  0 0006 1  BDDV      EXTEND                        MOVE DIVISOR INTO MPAC SAVING MPAC, THE
 1057    REF  62 LAST  73          7532  5 0102 1            INDEX    ADDRWD               DIVIDEND, IN BUF.
 1058                              7533  3 0001 0            DCA      0
 1059    REF 127 LAST  72          7534  52 141 1            DXCH     MPAC
 1060    REF  16 LAST  66          7535  52 115 0   +4       DXCH     BUF
 1061    REF  11 LAST  67          7536  3 7665 0            CAF      ZERO                 DIVIDE ROUTINES IN BANK 0.
 1062    REF  24 LAST  55          7537  54 004 1            TS       FBANK
 1063    REF   1                   7540  1 2332 0            TCF      DDV/BDDV

 1064    REF  63 LAST  73          7541  3 0102 1  SETPD     CA       ADDRWD               ANYWHERE IN ERASABLE IN GENERAL, BUT
 1065    REF  12 LAST  52          7542  54 152 0            TS       PUSHLOC              ALMOST ALWAYS IN THE WORK AREA.
 1066    REF   1                   7543  1 6016 1            TCF      NOIBNKSW             NO FBANK SWITCH REQUIRED.

 1067    REF  12 LAST  73          7544  3 7665 0  TSLC      CAF      ZERO                 SHIFTING ROUTINES LOCATED IN BANK 00.
 1068    REF  25 LAST  73          7545  54 004 1            TS       FBANK
 1069    REF   1                   7546  1 2153 0            TCF      TSLC2

 1070    REF   2 LAST  35          7547  3 6027 1  GSHIFT    CAF      LOW7                 USED AS MASK AT GENSHIFT. THIS PROCESSES
 1071    REF  26 LAST  73          7550  54 004 1            TS       FBANK                ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
 1072    REF   1                   7551  1 2174 0            TCF      GENSHIFT             AN ADDRESS (ROUTINES IN BANK 0).
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P1073          THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUF
R1075   AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1077   THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.


 1078   REF  14 LAST  69      7552  10 147 1  V/SC     CCS     MODE
 1079   REF   1               7553  1 7564 0           TCF     DV/SC              MOVE VECTOR INTO MPAC.
 1080   REF   2 LAST  74      7554  1 7564 0           TCF     DV/SC

 1081                         7555  0 0006 1  VV/SC    EXTEND
 1082   REF  64 LAST  73      7556  5 0102 1           INDEX   ADDRWD
 1083                         7557  3 0001 0           DCA     0
 1084   REF  17 LAST  73      7560  52 115 0  V/SC1    DXCH    BUF                IN BOTH CASES, VECTOR IS NOW IN MPAC AND
 1085   REF  13 LAST  73      7561  3 7665 0           CAF     ZERO               SCALAR IN BUF.
 1086   REF  27 LAST  73      7562  54 004 1           TS      FBANK
 1087   REF   1               7563  1 2576 0           TCF     V/SC2

 1088                         7564  0 0006 1  DV/SC    EXTEND
 1089   REF  65 LAST  74      7565  5 0102 1           INDEX   ADDRWD
 1090                         7566  3 0003 1           DCA     2
 1091   REF 128 LAST  73      7567  52 144 1           DXCH    MPAC +3
 1092                         7570  0 0006 1           EXTEND
 1093   REF  66 LAST  74      7571  5 0102 1           INDEX   ADDRWD
 1094                         7572  3 0005 1           DCA     4
 1095   REF 129 LAST  74      7573  52 146 0           DXCH    MPAC +5

 1096   REF   5 LAST  70      7574  4 7657 0           CS      ONE                CHANGE MODE TO VECTOR.
 1097   REF  15 LAST  74      7575  54 147 1           TS      MODE

 1098                         7576  0 0006 1           EXTEND
 1099   REF  67 LAST  74      7577  5 0102 1           INDEX   ADDRWD
 1100                         7600  3 0001 0           DCA     0
 1101   REF 130 LAST  74      7601  52 141 1           DXCH    MPAC
 1102   REF   1               7602  1 7560 1           TCF     V/SC1              FINISH PROLOGUE AT COMMON SECTION.
```

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P1103               SIGN AND COMPLEMENT INSTRUCTIONS.

 1104   REF  68 LAST  74        7603  50 102 1  SIGN      INDEX   ADDRWD            CALL COMP INSTRUCTION IF WORD AT X IS
 1105                           7604  10 000 0            CCS     0                 NEGATIVE NON-ZERO.
 1106   REF   2 LAST  73        7605  1 6016 1            TCF     NOIBNKSW          NO FBANK SWITCH REQUIRED.
 1107                           7606  1 7610 0            TCF     +2
 1108   REF   2 LAST  44        7607  1 7616 0            TCF     COMP              DO THE COMPLEMENT.

 1109   REF  69 LAST  75        7610  50 102 1            INDEX   ADDRWD
 1110                           7611  10 001 1            CCS     1
 1111   REF   3 LAST  75        7612  1 6016 1            TCF     NOIBNKSW          NO FBANK SWITCH REQUIRED.
 1112   REF   4 LAST  75        7613  1 6016 1            TCF     NOIBNKSW          NO FBANK SWITCH REQUIRED.
 1113   REF   3 LAST  75        7614  1 7616 0            TCF     COMP
 1114   REF   5 LAST  75        7615  1 6016 1            TCF     NOIBNKSW          NO FBANK SWITCH REQUIRED.


 1115                           7616  0 0006 1  COMP      EXTEND                    COMPLEMENT DP MPAC IN EVERY CASE.
 1116   REF 131 LAST  74        7617  4 0141 1            DCS     MPAC
 1117   REF 132 LAST  75        7620  52 141 1            DXCH    MPAC

 1118   REF  16 LAST  74        7621  10 147 1            CCS     MODE              EITHER COMPLEMENT MPAC +3 OR THE REST OF
 1119   REF   1                 7622  1 7633 1            TCF     DCOMP             THE VECTOR ACCUMULATOR.
 1120   REF   2 LAST  75        7623  1 7633 1            TCF     DCOMP

 1121                           7624  0 0006 1            EXTEND                    VECTOR COMPLEMENT.
 1122   REF 133 LAST  75        7625  4 0144 1            DCS     MPAC +3
 1123   REF 134 LAST  75        7626  52 144 1            DXCH    MPAC +3
 1124                           7627  0 0006 1            EXTEND
 1125   REF 135 LAST  75        7630  4 0146 0            DCS     MPAC +5
 1126   REF 136 LAST  75        7631  52 146 0            DXCH    MPAC +5
 1127   REF  18 LAST  73        7632  1 6014 0            TCF     DANZIG

 1128   REF 137 LAST  75        7633  4 0142 1  DCOMP     CS      MPAC +2
 1129   REF 138 LAST  75        7634  54 142 1            TS      MPAC +2
 1130   REF  19 LAST  75        7635  1 6014 0            TCF     DANZIG
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P1131           CONSTANTS REQUIRED IN FIXED-FIXED.

 1132                               7636   37777 1  DPOSMAX   OCT     37777
 1133                               7637   37777 1  POSMAX    OCT     37777
 1134     REF   3 LAST  66                    7640  LIMITS    EQUALS  POSMAX +1
 1135                               7640   57777 1  NEG1/2    OCT     -20000        MUST BE TWO LOCATIONS AHEAD OF POS1/2.

 1136                               7641   40000 0  BIT15     OCT     40000         BIT TABLE FOLLOWS.
 1137                               7642   20000 0  BIT14     OCT     20000
 1138                               7643   10000 0  BIT13     OCT     10000
 1139                               7644   04000 0  BIT12     OCT     04000
 1140                               7645   02000 0  BIT11     OCT     02000
 1141                               7646   01000 0  BIT10     OCT     01000
 1142                               7647   00400 0  BIT9      OCT     00400
 1143                               7650   00200 0  BIT8      OCT     00200
 1144                               7651   00100 0  BIT7      OCT     00100
 1145                               7652   00040 0  BIT6      OCT     00040
 1146                               7653   00020 0  BIT5      OCT     00020
 1147                               7654   00010 0  BIT4      OCT     00010
 1148                               7655   00004 0  BIT3      OCT     00004
 1149                               7656   00002 0  BIT2      OCT     00002
 1150                               7657   00001 0  BIT1      OCT     00001

 1151     REF   3 LAST  34                    7641  NEGMAX    EQUALS  BIT15
 1152     REF   1                             7642  HALF      EQUALS  BIT14
 1153     REF   1                             7642  POS1/2    EQUALS  HALF
 1154     REF   1                             7643  QUARTER   EQUALS  BIT13
 1155     REF   1                             7645  2K        EQUALS  BIT11
 1156                               7660   00013 0  ELEVEN    DEC     11
 1157     REF   1                             7660  NOUTCON   =       ELEVEN
 1158                               7661   00012 1  TEN       DEC     10
 1159                               7662   00011 1  NINE      DEC     9
 1160     REF   1                             7654  EIGHT     EQUALS  BIT4
 1161                               7663   00007 0  SEVEN     OCT     7
 1162     REF   2 LAST  39                    6162  SIX       EQUALS  REVCNT
 1163                               7664   00005 1  FIVE      OCT     5
 1164     REF   1                             7655  FOUR      EQUALS  BIT3
 1165     REF   5 LAST  52                    6165  THREE     EQUALS  NO.WDS +1
 1166     REF   1                             7656  TWO       EQUALS  BIT2
 1167     REF   2 LAST  36                    7657  ONE       EQUALS  BIT1
 1168                               7665   00000 1  ZERO      OCT     0
 1169                               7666   77777 0  NEG0      OCT     77777
 1170                               7667   77776 1  NEGONE    DEC     -1

 1171     REF   2 LAST  45                    7667  NEG1      =       NEGONE
 1172     REF   1                             7667  MINUS1    EQUALS  NEG1
 1173                               7670   77775 1  NEG2      OCT     77775
 1174                               7671   77774 0  NEG3      DEC     -3
 1175                               7672   00777 0  LOW9      OCT     777
 1176                               7673   00017 1  LOW4      OCT     17
 1177   REF    1                                7663  LOW3      EQUALS SEVEN
 1178   REF    1                                6165  LOW2      EQUALS THREE

 1179                              7674   00030 1  CALLCODE OCT    00030
 1180                              7675   40014 0  DLOADCOD OCT    40014
 1181   REF    4 LAST   76                  7641  VLOADCOD EQUALS BIT15
 1182                              7676   40015 1  DLOAD*   OCT    40015
 1183   REF    1                                6042  VLOAD*   EQUALS OCT40001
 1184   REF   30 LAST   72         7677   00106 0  LVBUF    ADRES  VBUF
 1185                              7700   30000 1  BIT13-14 OCTAL  30000
 1186                                          7701  ENDINTF  EQUALS
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P1187   SHIFTING AND ROUNDING PACKAGE.

R1188           THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

R1189           1.  SR1 TO SR4          SCALAR SHIFT RIGHT.
R1190           2.  SR1R TO SR4R        SCALAR SHIFT RIGHT AND ROUND.
R1191           3.  SL1 TO SL4          SCALAR SHIFT LEFT.
R1192           4.  SL1R TO SL4R        SCALAR SHIFT LEFT AND ROUND.

R1193           5.  VSR1 TO VSR8        VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
R1194           6.  VSL1 TO VSL8        VECTOR SHIFT LEFT (NEVER ROUNDS).

R1195           THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

R1196           1.  SR                  SCALAR SHIFT RIGHT.
R1197           2.  SRR                 SCALAR SHIFT RIGHT AND ROUND.
R1198           3.  SL                  SCALAR SHIFT LEFT.
R1199           4.  SLR                 SCALAR SHIFT LEFT AND ROUND.

R1200           5.  VSR                 VECTOR SHIFT RIGHT.
R1201           6.  VSL                 VECTOR SHIFT LEFT.

R1202   *  IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
R1204   ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.


 1205                             00,2000                SETLOC 10000           BANK 0 PORTION FOLLOWS.

 1206   REF   2 LAST  67      00,2000  3 6162 1  SHORTT    CAF    SIX             SCALAR SHORT SHIFTS COME HERE. THE SHIFT
 1207   REF  17 LAST  49      00,2001  7 0020 1            MASK   CYR             COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
 1208   REF   1               00,2002  54 021 0            TS     SR              ROUNDING BIT IS IN BIT1 AT THIS POINT.

 1209   REF  18 LAST  78      00,2003  10 020 1            CCS    CYR             SEE IF RIGHT OR LEFT SHIFT DESIRED.
 1210   REF   1               00,2004  1 2062 0            TCF    TSSL            SHIFT LEFT.

 1211                         00,2005   00024 1  SRDDV     DEC    20              MPTEMP SETTING FOR SR BEFORE DDV.

 1212   REF   2 LAST  78      00,2006  50 021 1  TSSR      INDEX  SR              GET SHIFTING BIT.
 1213   REF   2 LAST  76      00,2007  3 7642 0            CAF    BIT14
 1214   REF  11 LAST  66      00,2010  54 121 1            TS     MPTEMP

 1215   REF  19 LAST  78      00,2011  10 020 1            CCS    CYR             SEE IF A ROUND IS DESIRED.
 1216   REF   1               00,2012  0 2031 1  RIGHTR    TC     MPACSRND        YES - SHIFT RIGHT AND ROUND.
 1217   REF   6 LAST  70      00,2013  1 6013 1            TCF    NEWMODE         SET MODE TO DP (C(A) = 0).
 1218   REF  12 LAST  78      00,2014  3 0121 0  MPACSHR   CA     MPTEMP          DO A TRIPLE PRECISION SHIFT RIGHT.
 1219                         00,2015  0 0006 1            EXTEND
 1220   REF 139 LAST  75      00,2016  7 0142 1            MP     MPAC +2
 1221   REF 140 LAST  78      00,2017  54 142 1   +3       TS     MPAC +2         (EXIT FROM SQRT AND ABVAL).
 1222   REF  13 LAST  78      00,2020  3 0121 0            CA     MPTEMP
 1223                        00,2021  0 0006 1            EXTEND
 1224  REF 141 LAST  78      00,2022  7 0140 0            MP       MPAC             SHIFT MAJOR PART INTO A,L AND PLACE IN
 1225  REF 142 LAST  79      00,2023  52 141 1            DXCH     MPAC             MPAC,+1.
 1226  REF  14 LAST  78      00,2024  3 0121 0            CA       MPTEMP
 1227                        00,2025  0 0006 1            EXTEND
 1228  REF   5 LAST  62      00,2026  7 0001 1            MP       L                ORIGINAL C(MPAC +1).
 1229  REF 143 LAST  79      00,2027  20 142 1            DAS      MPAC +1          GUARANTEED NO OVERFLOW.
 1230  REF  20 LAST  75      00,2030  1 6014 0            TCF      DANZIG

R1231           MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

 1232  REF 144 LAST  79      00,2031  3 0142 0  MPACSRND  CA       MPAC +2          WE HAVE TO DO ALL THREE MULTIPLIES SINCE
 1233                        00,2032  0 0006 1            EXTEND                    MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
 1234  REF  15 LAST  79      00,2033  7 0121 1            MP       MPTEMP           DISAGREEMENT WITH A SHIFT RIGHT OF 1.
 1235  REF 145 LAST  79      00,2034  56 141 0            XCH      MPAC +1
 1236                        00,2035  0 0006 1            EXTEND
 1237  REF  16 LAST  79      00,2036  7 0121 1            MP       MPTEMP
 1238  REF 146 LAST  79      00,2037  56 141 0            XCH      MPAC +1          TRIAL MINOR PART.
 1239  REF   6 LAST  79      00,2040  6 0001 0            AD       L

 1240                        00,2041  6 0000 1  VSHR2     DOUBLE                    (FINISH VECTOR COMPONENT SHIFT RIGHT
 1241  REF 147 LAST  79      00,2042  54 142 1            TS       MPAC +2          AND ROUND.
 1242                        00,2043  1 2045 0            TCF      +2
 1243  REF 148 LAST  79      00,2044  26 141 1            ADS      MPAC +1          GUARANTEED NO OVERFLOW.

 1244  REF  14 LAST  74      00,2045  3 7665 0            CAF      ZERO
 1245  REF 149 LAST  79      00,2046  54 142 1            TS       MPAC +2
 1246  REF 150 LAST  79      00,2047  56 140 1            XCH      MPAC             SETTING TO ZERO SO FOLLOWING DAS WORKS.
 1247                        00,2050  0 0006 1            EXTEND
 1248  REF  17 LAST  79      00,2051  7 0121 1            MP       MPTEMP
 1249  REF 151 LAST  79      00,2052  20 141 1            DAS      MPAC             AGAIN NO OVERFLOW.
 1250  REF  43 LAST  72      00,2053  0 0002 0            TC       Q

 1251  REF  18 LAST  79      00,2054  3 0121 0  VSHRRND   CA       MPTEMP           ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
 1252                        00,2055  0 0006 1            EXTEND                    MPAC CONTAINS A VECTOR COMPONENT.
 1253  REF 152 LAST  79      00,2056  7 0141 1            MP       MPAC +1
 1254  REF 153 LAST  79      00,2057  54 141 1            TS       MPAC +1
 1255  REF   7 LAST  79      00,2060  56 001 0            XCH      L
 1256  REF   1               00,2061  1 2041 1            TCF      VSHR2            GO ADD ONE IF NECESSARY AND FINISH.
```

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P1257            ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

 1258  REF   3 LAST  78      00,2062  3 0021 1  TSSL      CA       SR                GET SHIFT COUNT FOR SR.
 1259  REF  19 LAST  79      00,2063  54 121 1   +1       TS       MPTEMP

 1260                        00,2064  0 0006 1   +2       EXTEND                     ENTRY HERE FROM SL FOR SCALARS.
 1261  REF 154 LAST  79      00,2065  3 0142 0            DCA      MPAC +1           SHIFTING LEFT ONE PLACE AT A TIME IS
 1262  REF 155 LAST  80      00,2066  20 142 1            DAS      MPAC +1           FASTER THAN DOING THE WHOLE SHIFT WITH
 1263  REF 156 LAST  80      00,2067  6 0140 1            AD       MPAC              MULTIPLIES ASSUMING THAT FREQUENCY OF
 1264  REF 157 LAST  80      00,2070  6 0140 1            AD       MPAC              SHIFT COUNTS GOES DOWN RAPIDLY AS A
 1265  REF 158 LAST  80      00,2071  54 140 0            TS       MPAC              FUNCTION OF THEIR MAGNITUDE.
 1266                        00,2072  1 2074 1            TCF      +2
 1267  REF   5 LAST  63      00,2073  54 105 1            TS       OVFIND            OVERFLOW. (LEAVES OVERFLOW-CORRECTED
A1268                                                                                RESULT ANYWAY).
 1269  REF  20 LAST  80      00,2074  10 121 1            CCS      MPTEMP            LOOP ON DECREMENTED SHIFT COUNT.
 1270  REF   2 LAST  78      00,2075  1 2063 1            TCF      TSSL +1

 1271  REF  20 LAST  78      00,2076  10 020 1            CCS      CYR               SEE IF ROUND WANTED.
 1272  REF   2 LAST  73      00,2077  0 7116 0  ROUND     TC       ROUNDSUB          YES - ROUND AND EXIT.
 1273  REF  21 LAST  79      00,2100  1 6014 0            TCF      DANZIG            SL LEAVES A ZERO IN CYR FOR NO ROUND.
 1274  REF  22 LAST  80      00,2101  1 6014 0            TCF      DANZIG            NO - EXIT IMMEDIATL
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P1275   VECTOR SHIFTING ROUTINES.

 1276   REF   1              00,2102   3 7663 0  SHORTV    CAF     LOW3              SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
 1277   REF  21 LAST  80     00,2103   7 0020 1            MASK    CYR               EDITING CYR.
 1278   REF  21 LAST  80     00,2104  54 121 1             TS      MPTEMP
 1279   REF  22 LAST  81     00,2105  10 020 1             CCS     CYR               SEE IF LEFT OR RIGHT SHIFT.
 1280   REF   1              00,2106   1 2126 1            TCF     VSSL              VECTOR SHIFT LEFT.
 1281                        00,2107    00176 1  OCT176    OCT     176               USED IN PROCESSED SHIFTS WITH - COUNT.

 1282   REF  22 LAST  81     00,2110  50 121 0   VSSR      INDEX   MPTEMP            (ENTRY FROM SR), PICK UP SHIFTING BIT.
 1283   REF   3 LAST  78     00,2111   3 7642 0            CAF     BIT14             MPTEMP CONTAINS THE SHIFT COUNT - 1.
 1284   REF  23 LAST  81     00,2112  54 121 1             TS      MPTEMP
 1285   REF   1              00,2113   0 2054 1            TC      VSHRRND           SHIFT X COMPONENT.

 1286   REF 159 LAST  80     00,2114  52 141 1             DXCH    MPAC              SWAP X AND Y COMPONENTS.
 1287   REF 160 LAST  81     00,2115  52 144 1             DXCH    MPAC +3
 1288   REF 161 LAST  81     00,2116  52 141 1             DXCH    MPAC
 1289   REF   2 LAST  81     00,2117   0 2054 1            TC      VSHRRND           SHIFT Y COMPONENT.

 1290   REF 162 LAST  81     00,2120  52 141 1             DXCH    MPAC              SWAP Y AND Z COMPONENTS.
 1291   REF 163 LAST  81     00,2121  52 146 0             DXCH    MPAC +5
 1292   REF 164 LAST  81     00,2122  52 141 1             DXCH    MPAC
 1293   REF   3 LAST  81     00,2123   0 2054 1            TC      VSHRRND           SHIFT Z COMPONENT.

 1294   REF   1              00,2124   1 7373 0            TCF     VROTATEX          RESTORE COMPONENTS TO PROPER PLACES.
```

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P1295   VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

 1296   REF  24 LAST  81     00,2125  54 121 1   -1      TS      MPTEMP        SHIFTING LOOP.

 1297                        00,2126  0 0006 1  VSSL     EXTEND
 1298   REF 165 LAST  81     00,2127  3 0141 0           DCA     MPAC
 1299   REF 166 LAST  82     00,2130  20 141 1           DAS     MPAC
 1300                        00,2131  0 0006 1           EXTEND
 1301                        00,2132  1 2134 1           BZF     +2
 1302   REF  12 LAST  72     00,2133  0 7007 1           TC      OVERFLOW

 1303                        00,2134  0 0006 1           EXTEND
 1304   REF 167 LAST  82     00,2135  3 0144 0           DCA     MPAC +3
 1305   REF 168 LAST  82     00,2136  20 144 1           DAS     MPAC +3
 1306                        00,2137  0 0006 1           EXTEND
 1307                        00,2140  1 2142 0           BZF     +2
 1308   REF  13 LAST  82     00,2141  0 7007 1           TC      OVERFLOW

 1309                        00,2142  0 0006 1           EXTEND
 1310   REF 169 LAST  82     00,2143  3 0146 1           DCA     MPAC +5
 1311   REF 170 LAST  82     00,2144  20 146 0           DAS     MPAC +5
 1312                        00,2145  0 0006 1           EXTEND
 1313                        00,2146  1 2150 0           BZF     +2
 1314   REF  14 LAST  82     00,2147  0 7007 1           TC      OVERFLOW

 1315   REF  25 LAST  82     00,2150  10 121 1           CCS     MPTEMP        LOOP ON DECREMENTED SHIFT COUNTER.
 1316   REF   2 LAST  81     00,2151  1 2125 1           TCF     VSSL -1
 1317   REF  23 LAST  80     00,2152  1 6014 0           TCF     DANZIG        EXIT.
```

```
P1318           TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1320   THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

 1321   REF  26 LAST  82     00,2153  54 121 1  TSLC2     TS      MPTEMP          START BY ZEROING SHIFT COUNT (IN A NOW).
 1322   REF   2 LAST  66     00,2154  0 6711 0            TC      BRANCH          EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
 1323                        00,2155  1 2157 1            TCF     +2
 1324   REF   1              00,2156  1 2172 0            TCF     ENDTSLC         STORES ZERO SHIFT COUNT IN THIS CASE.

 1325   REF 171 LAST  82     00,2157  3 0140 1            CA      MPAC            BEGIN NORMALIZATION LOOP.
 1326   REF   1              00,2160  1 2167 1            TCF     TSLCTEST

 1327   REF  27 LAST  83     00,2161  24 121 0  TSLCLOOP  INCR    MPTEMP          INCREMENT SHIFT COUNTER.
 1328                        00,2162  0 0006 1            EXTEND
 1329   REF 172 LAST  83     00,2163  3 0142 0            DCA     MPAC +1
 1330   REF 173 LAST  83     00,2164  20 142 1            DAS     MPAC +1
 1331   REF 174 LAST  83     00,2165  6 0140 1            AD      MPAC
 1332   REF 175 LAST  83     00,2166  26 140 0            ADS     MPAC
 1333                        00,2167  6 0000 1  TSLCTEST  DOUBLE                  SEE IF (ANOTHER) SHIFT IS REQUIRED.
 1334                        00,2170  54 000 0            OVSK
 1335   REF   1              00,2171  1 2161 1            TCF     TSLCLOOP        YES - INCREMENT COUNT AND SHIFT AGAIN.

 1336   REF  28 LAST  83     00,2172  4 0121 1  ENDTSLC   CS      MPTEMP
 1337   REF   1              00,2173  1 6627 0            TCF     STORE1          STORE SHIFT COUNT AND RETURN TO DANZIG.
```

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P1338             THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1340   THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1341             BITS 1-7     SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1342             BIT 8        PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1344             BIT 9        0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1345             BIT 10       1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1346             BITS 11-15   0.

R1347   THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.


 1348    REF  70 LAST  75      00,2174  7 0102 0  GENSHIFT MASK    ADDRWD           GET SHIFT COUNT, TESTING FOR ZERO.
 1349    REF  21 LAST  66      00,2175  10 000 0           CCS     A                (ARRIVES WITH C(A) = LOW7).
 1350    REF   1               00,2176  1 2204 1           TCF     GENSHFT2         IF NON-ZERO, PROCEED WITH DECREMENTED CT

 1351    REF   1               00,2177  3 7646 1           CAF     BIT10            ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
 1352    REF  71 LAST  84      00,2200  7 0102 0           MASK    ADDRWD           WE MIGHT HAVE TO ROUND MPAC ON SLR AND
 1353    REF  22 LAST  84      00,2201  10 000 0           CCS     A                SRR (SCALAR ONLY).
 1354    REF   3 LAST  80      00,2202  0 7116 0           TC      ROUNDSUB
 1355    REF  24 LAST  82      00,2203  1 6014 0           TCF     DANZIG

 1356    REF  29 LAST  83      00,2204  54 121 1  GENSHFT2 TS      MPTEMP           DECREMENTED SHIFT COUNT TO MPTEMP.
 1357    REF   3 LAST  31      00,2205  3 7650 0           CAF     BIT8             TEST MEANING OF LOW SEVEN BIT COUNT IN
 1358                          00,2206  0 0006 1           EXTEND                   MPTEMP NOW.
 1359    REF  72 LAST  84      00,2207  7 0102 0           MP      ADDRWD
 1360    REF   1               00,2210  7 6165 1           MASK    LOW2             JUMPS ON SHIFT DIRECTION (BIT8) AND
 1361    REF  23 LAST  84      00,2211  50 000 1           INDEX   A
 1362                          00,2212  1 2213 1           TCF     +1               ORIGINAL SHIFT DIRECTION (BIT 9).
 1363    REF   1               00,2213  1 2312 1           TCF     RIGHT-           NEGATIVE SHIFT COUNT FOR SL OR SLR.
 1364    REF   1               00,2214  1 2321 1           TCF     LEFT             SL OR SLR.
 1365    REF   1               00,2215  1 2316 0           TCF     LEFT-            NEGATIVE SHIFT COUNT WITH SR OR SRR.
```

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P1366             GENERAL SHIFT RIGHT.

 1367   REF  17 LAST  75      00,2216  10 147 1  RIGHT     CCS     MODE              SEE IF VECTOR OR SCALAR.
 1368   REF   1               00,2217  1 2257 1            TCF     GENSCR
 1369   REF   2 LAST  85      00,2220  1 2257 1            TCF     GENSCR

 1370   REF  30 LAST  84      00,2221  3 0121 0            CA      MPTEMP            SEE IF SHIFT COUNT GREATER THAN 13D.
 1371   REF   1               00,2222  6 2273 0  VRIGHT2   AD      NEG12
 1372                         00,2223  0 0006 1            EXTEND
 1373   REF   1               00,2224  6 2110 0            BZMF    VSSR              IF SO, BRANCH AND SHIFT IMMEDIATELY.

 1374   REF   3 LAST  76      00,2225  6 7667 1            AD      NEGONE            IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
 1375   REF  31 LAST  85      00,2226  54 121 1            TS      MPTEMP            AND DO A SHIFT RIGHT AND ROUND BY 14.
 1376   REF  15 LAST  79      00,2227  3 7665 0            CAF     ZERO              THE ROUND AT THIS STAGE MAY INTRODUCE A
 1377   REF   8 LAST  79      00,2230  54 001 1            TS      L                 ONE BIT ERROR IN A SHIFT RIGHT 15D.
 1378   REF 176 LAST  83      00,2231  56 140 1            XCH     MPAC
 1379   REF 177 LAST  85      00,2232  56 141 0            XCH     MPAC +1
 1380   REF   1               00,2233  0 2252 0            TC      SETROUND          X COMPONENT NOW SHIFTED, SO MAKE UP THE
 1381   REF 178 LAST  85      00,2234  20 141 1            DAS     MPAC              ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1382                                                                                IN L).
 1383   REF 179 LAST  85      00,2235  56 143 1            XCH     MPAC +3           REPEAT THE ABOVE PROCESS FOR Y AND Z.
 1384   REF 180 LAST  85      00,2236  56 144 0            XCH     MPAC +4
 1385   REF   2 LAST  85      00,2237  0 2252 0            TC      SETROUND
 1386   REF 181 LAST  85      00,2240  20 144 1            DAS     MPAC +3           NO OVERFLOW ON THESE ADDS.

 1387   REF 182 LAST  85      00,2241  56 145 1            XCH     MPAC +5
 1388   REF 183 LAST  85      00,2242  56 146 1            XCH     MPAC +6
 1389   REF   3 LAST  85      00,2243  0 2252 0            TC      SETROUND
 1390   REF 184 LAST  85      00,2244  20 146 0            DAS     MPAC +5

 1391   REF  32 LAST  85      00,2245  10 121 1            CCS     MPTEMP            SEE IF DONE, DOING FINAL DECREMENT.
 1392   REF   1               00,2246  1 2222 0            TCF     VRIGHT2
 1393   REF   1               00,2247  1 3630 0  TCSUBTR   TCF     SUBTR
 1394                         00,2250   04604 1  BIASLO    DEC     .2974 B-1         SQRT CONSTANT

 1395   REF  25 LAST  84      00,2251  1 6014 0            TCF     DANZIG


 1396                         00,2252  6 0000 1  SETROUND DOUBLE                     MAKES UP ROUNDING QUANTITY FROM ARRIVING
 1397   REF 185 LAST  85      00,2253  54 142 1            TS      MPAC +2           C(A). L IS ZERO INITIALLY.
 1398   REF  16 LAST  85      00,2254  3 7665 0            CAF     ZERO
 1399   REF   9 LAST  85      00,2255  56 001 0            XCH     L
 1400   REF  44 LAST  79      00,2256  0 0002 0            TC      Q                 RETURN AND DO THE DAS, RESETTING L TO 0,
P1401           PROCESS SR AND SRR FOR SCALARS.

 1402   REF  33 LAST  85      00,2257   3 0121 0  GENSCR    CA       MPTEMP            SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
 1403   REF   2 LAST  85      00,2260   6 2273 0   +1       AD       NEG12             THAN 14D.
 1404                         00,2261   0 0006 1            EXTEND
 1405   REF   1               00,2262   6 2302 1            BZMF     DOSSHFT           DO THE SHIFT IMMEDIATELY IF SO.

 1406   REF   4 LAST  85      00,2263   6 7667 1   +4       AD       NEGONE            IF NOT, DECREMENT SHIFT COUNT BY 14D AND
 1407   REF  34 LAST  86      00,2264  54 121  1            TS       MPTEMP            SHIFT MPAC RIGHT 14 PLACES.
 1408   REF  17 LAST  85      00,2265   3 7665 0            CAF      ZERO
 1409   REF 186 LAST  85      00,2266  56 140  1            XCH      MPAC
 1410   REF 187 LAST  86      00,2267  56 141  0            XCH      MPAC +1
 1411   REF 188 LAST  86      00,2270  54 142  1            TS       MPAC +2
 1412   REF  35 LAST  86      00,2271  10 121  1            CCS      MPTEMP            SEE IF FINISHED, DO FINAL DECREMENT.
 1413   REF   3 LAST  85      00,2272   0 2260 1            TC       GENSCR +1
 1414                         00,2273    77763 0  NEG12     DEC      -12
 1415                         00,2274    22650 1  SLOPEHI   DEC      .5884             SQRT CONSTANT.
 1416   REF   2 LAST  84      00,2275   3 7646 1            CAF      BIT10             FINISHED WITH SHIFT. SEE IF ROUND
 1417   REF  73 LAST  84      00,2276   7 0102 0            MASK     ADDRWD            WANTED.
 1418   REF  24 LAST  84      00,2277  10 000  0            CCS      A
 1419   REF   4 LAST  84      00,2300   0 7116 0            TC       ROUNDSUB
 1420   REF  26 LAST  85      00,2301   1 6014 0            TCF      DANZIG            DO SO AND/OR EXIT.

 1421   REF  36 LAST  86      00,2302  50 121  0  DOSSHFT   INDEX    MPTEMP            PICK UP SHIFTING BIT.
 1422   REF   4 LAST  81      00,2303   3 7642 0            CAF      BIT14
 1423   REF  37 LAST  86      00,2304  54 121  1            TS       MPTEMP
 1424   REF   3 LAST  86      00,2305   3 7646 1            CAF      BIT10             SEE IF TERMINAL ROUND DESIRED.
 1425   REF  74 LAST  86      00,2306   7 0102 0            MASK     ADDRWD
 1426   REF  25 LAST  86      00,2307  10 000  0            CCS      A
 1427   REF   1               00,2310   1 2012 1            TCF      RIGHTR            YES.
 1428   REF   1               00,2311   1 2014 1            TCF      MPACSHR           JUST SHIFT RIGHT.
```

```
P1429          PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

 1431   REF  38 LAST  86      00,2312   4 0121 1  RIGHT-    CS       MPTEMP            GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
 1432   REF   1               00,2313   6 2107 0            AD       OCT176            UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
 1433   REF  39 LAST  87      00,2314  54 121 1             TS       MPTEMP            WAS 1 INITIALLY.
 1434   REF   1               00,2315   1 2216 1            TCF      RIGHT             DO NORMAL SHIFT RIGHT.

 1435   REF  40 LAST  87      00,2316   4 0121 1  LEFT-     CS       MPTEMP            SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
 1436   REF   2 LAST  87      00,2317   6 2107 0            AD       OCT176            SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
 1437   REF  41 LAST  87      00,2320  54 121 1             TS       MPTEMP

 1438   REF  18 LAST  85      00,2321  10 147 1   LEFT      CCS      MODE              SINCE LEFT SHIFTING IS SONE ONE PLACE AT
 1439   REF   1               00,2322   1 2325 0            TCF      GENSCL            A TIME, NO COMPARISON WITH 14 NEED BE
 1440   REF   2 LAST  87      00,2323   1 2325 0            TCF      GENSCL            DONE. FOR SCALARS, SEE IF TERMINAL ROUND
 1441   REF   3 LAST  82      00,2324   1 2126 1            TCF      VSSL              DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

 1442   REF   2 LAST  45      00,2325   3 7652 1  GENSCL    CAF      BIT6              PUT ROUNDING BIT (BIT10 OF ADDRWD) INTO
 1443                         00,2326   0 0006 1            EXTEND                     BIT 15 OF CYR WHERE THE ROUNDING BIT OF
 1444   REF  75 LAST  86      00,2327   7 0102 0            MP       ADDRWD            A SHORT SHIFT LEFT WOULD BE.
 1445   REF  23 LAST  81      00,2330  54 020 1             TS       CYR
 1446   REF   3 LAST  80      00,2331   1 2064 0            TCF      TSSL +2           DO THE SHIFT.
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L       LIST-PROCESSING INTERPRETER                                                     USER'S OWN PAGE NO.  55

P1447           SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1449   AND THE DIVISOR IN BUF.

 1450   REF   6 LAST  74     00,2332  4 7657 0  DDV/BDDV CS      ONE            INITIALIZATION.
 1451   REF   1              00,2333  54 122 1           TS      DVSIGN         +-1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
 1452   REF   1              00,2334  54 123 0           TS      DVNORMCT       DIVIDEND NORMALIZATION COUNT.
 1453   REF   1              00,2335  54 124 1           TS      MAXDVSW        NEAR-ONE DIVIDE FLAG.

 1454   REF  18 LAST  74     00,2336  10 114 1           CCS     BUF            FORCE BUF POSITIVE WITH THE MAJOR PART
 1455   REF   1              00,2337  1 2366 1           TCF     BUF+           NON-ZERO.
 1456                        00,2340  1 2342 1           TCF     +2
 1457   REF   1              00,2341  1 2362 0           TCF     BUF-

 1458   REF  19 LAST  88     00,2342  56 115 1           XCH     BUF +1         SHIFT DIVIDEND AND DIVISOR LEFT 14.
 1459   REF  20 LAST  88     00,2343  56 114 0           XCH     BUF
 1460   REF 189 LAST  86     00,2344  56 141 0           XCH     MPAC +1
 1461   REF 190 LAST  88     00,2345  56 140 1           XCH     MPAC
 1462                        00,2346  0 0006 1           EXTEND                 CHECK FOR OVERFLOW.
 1463                        00,2347  1 2351 0           BZF     +2
 1464   REF   1              00,2350  1 2355 1           TCF     DVOVF

 1465   REF  21 LAST  88     00,2351  10 114 1           CCS     BUF            TRY AGAIN ON FORMER MINOR PART.
 1466   REF   2 LAST  88     00,2352  1 2366 1           TCF     BUF+
 1467   REF   2 LAST  88     00,2353  1 2355 1           TCF     DVOVF          OVERFLOW ON ZERO DIVISOR.
 1468   REF   2 LAST  88     00,2354  1 2362 0           TCF     BUF-

 1469   REF   4 LAST  76     00,2355  3 7637 1  DVOVF    CAF     POSMAX         ON DIVISION OVERFLOW OF ANY SORT, SET
 1470   REF 191 LAST  88     00,2356  54 140 0           TS      MPAC           SET DP MPAC TO +-POSMAX.
 1471   REF   1              00,2357  0 2552 1           TC      FINALDV +3
 1472   REF   7 LAST  88     00,2360  3 7657 1           CAF     ONE            SET OVERFLOW INDICATOR AND EXIT.
 1473   REF   1              00,2361  1 7061 0           TCF     SETOVF

 1474                        00,2362  0 0006 1  BUF-     EXTEND                 IF BUF IS NEGATIVE, COMPLEMENT IT AND
 1475   REF  22 LAST  88     00,2363  4 0115 0           DCS     BUF            MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
 1476   REF  23 LAST  88     00,2364  52 115 0           DXCH    BUF
 1477   REF   2 LAST  88     00,2365  24 122 0           INCR    DVSIGN         NOW -0.

 1478   REF 192 LAST  88     00,2366  10 140 0  BUF+     CCS     MPAC           FORCE MPAC POSITIVE, CHECKING FOR ZERO
 1479   REF   1              00,2367  1 2403 0           TCF     MPAC+          DIVIDEND IN THE PROCESS.
 1480                        00,2370  1 2372 1           TCF     +2
 1481   REF   1              00,2371  1 2377 1           TCF     MPAC-
 1482   REF 193 LAST  88     00,2372  10 141 1           CCS     MPAC +1
 1483   REF   2 LAST  88     00,2373  1 2403 0           TCF     MPAC+
 1484   REF  27 LAST  86     00,2374  1 6014 0           TCF     DANZIG         EXIT IMMEDIATELY ON ZERO DIVIDEND.
 1485   REF   2 LAST  88     00,2375  1 2377 1           TCF     MPAC-
 1486   REF  28 LAST  88     00,2376  1 6014 0           TCF     DANZIG

 1487                        00,2377  0 0006 1  MPAC-    EXTEND                 FORCE MPAC POSITIVE AS BUF IN BUF-.
 1488   REF 194 LAST  88     00,2400  4 0141 1           DCS     MPAC
 1489   REF 195 LAST  88     00,2401  52 141 1           DXCH    MPAC
 1490   REF   3 LAST  88     00,2402  24 122 0           INCR   DVSIGN          NOW +1 OR -0.
 1491  REF 196 LAST  88     00,2403  4 0140 0  MPAC+     CS       MPAC           CHECK FOR DIVISION OVERFLOW. IF THE
 1492  REF   5 LAST  86     00,2404  6 7667 1            AD       NEGONE         MAJOR PART OF THE DIVIDEND IS LESS THAN
 1493  REF  24 LAST  88     00,2405  6 0114 0            AD       BUF            THE MAJOR PART OF THE DIVISOR BY AT
 1494  REF  26 LAST  86     00,2406  10 000 0            CCS      A              LEAST TWO, WE CAN PROCEED IMMEDIATELY
 1495  REF   1              00,2407  1 2451 1            TCF      DVNORM         WITHOUT NORMALIZATION PRODUCING A DVMAX.
 1496                       00,2410   60001 0  -1/2+2    OCT      60001          USED IN SQRTSUB.

 1497                       00,2411  1 2412 0            TCF      +1             IF THE ABOVE DOES NOT HOLD, FORCE SIGN
 1498  REF   2 LAST  76     00,2412  3 7642 0            CAF      HALF           AGREEMENT IN NUMERATOR AND DENOMINATOR
 1499                       00,2413  6 0000 1            DOUBLE                  TO FACILITATE OVERFLOW AND NEAR-ONE
 1500  REF 197 LAST  90     00,2414  6 0141 0            AD       MPAC +1        CHECKING.
 1501  REF 198 LAST  90     00,2415  54 141 1            TS       MPAC +1
 1502  REF  18 LAST  86     00,2416  3 7665 0            CAF      ZERO
 1503  REF   5 LAST  88     00,2417  6 7637 1            AD       POSMAX
 1504  REF 199 LAST  90     00,2420  26 140 0            ADS      MPAC

 1505  REF   3 LAST  90     00,2421  3 7642 0            CAF      HALF           SAME FOR BUF.
 1506                       00,2422  6 0000 1            DOUBLE
 1507  REF  25 LAST  90     00,2423  6 0115 1            AD       BUF +1
 1508  REF  26 LAST  90     00,2424  54 115 0            TS       BUF +1
 1509  REF  19 LAST  90     00,2425  3 7665 0            CAF      ZERO
 1510  REF   6 LAST  90     00,2426  6 7637 1            AD       POSMAX
 1511  REF  27 LAST  90     00,2427  26 114 1            ADS      BUF

 1512  REF 200 LAST  90     00,2430  4 0140 0            CS       MPAC           CHECK MAGNITUDE OF SIGN-CORRECTED
 1513  REF  28 LAST  90     00,2431  6 0114 0            AD       BUF            OPERANDS.
 1514  REF  27 LAST  90     00,2432  10 000 0            CCS      A
 1515  REF   2 LAST  90     00,2433  1 2451 1            TCF      DVNORM         DIVIDE OK - WILL NOT BECOME MAXDV CASE.
 1516  REF  10 LAST  68     00,2434   00117 0  LBUF2     ADRES    BUF2
 1517  REF   3 LAST  88     00,2435  1 2355 1            TCF      DVOVF          DIVISOR NOT LESS THAN DIVIDEND - OVF.

 1518  REF   2 LAST  88     00,2436  54 124 1            TS       MAXDVSW        IF THE MAJOR PARTS OF THE DIVIDEND AND
 1519  REF 201 LAST  90     00,2437  4 0141 1            CS       MPAC +1        DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
 1520  REF  29 LAST  90     00,2440  6 0115 1            AD       BUF +1         TION IS USED (PROVIDED THE DIVISION IS
 1521                       00,2441  0 0006 1            EXTEND                  POSSIBLE, OF COURSE).
 1522  REF   4 LAST  90     00,2442  6 2355 0            BZMF     DVOVF
 1523  REF   3 LAST  90     00,2443  1 2451 1            TCF      DVNORM         IF NO OVERFLOW.
 1524                         00,2444  0 0006 1  BUFNORM   EXTEND                  ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
 1525   REF   2 LAST  88      00,2445  24 123 1            AUG     DVNORMCT        LEFT ONE PLACE.
 1526                         00,2446  0 0006 1            EXTEND
 1527   REF  30 LAST  90      00,2447  3 0115 1            DCA     BUF
 1528   REF  31 LAST  91      00,2450  20 115 0            DAS     BUF

 1529   REF  32 LAST  91      00,2451  3 0114 0  DVNORM    CA      BUF             SEE IF DIVISOR NORMALIZED YET.
 1530                         00,2452  6 0000 1            DOUBLE
 1531                         00,2453  54 000 0            OVSK
 1532   REF   1               00,2454  1 2444 0            TCF     BUFNORM         NO - SHIFT LEFT ONE AND TRY AGAIN.

 1533   REF 202 LAST  90      00,2455  52 141 1            DXCH    MPAC            CALL DIVIDEND NORMALIZATION SEQUENCE
 1534   REF   3 LAST  91      00,2456  50 123 1            INDEX   DVNORMCT        PRIOR TO DOING THE DIVIDE.
 1535   REF   1               00,2457  0 2507 1            TC      MAXTEST

 1536   REF 203 LAST  91      00,2460  54 142 1            TS      MPAC +2         RETURNS WITH DIVISION DONE AND C(A) = 0.
 1537   REF  29 LAST  88      00,2461  1 6014 0            TCF     DANZIG
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P1538              THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

 1540   REF    4 LAST  80     00,2462  22 021 1    -21D    LXCH    SR                  SPECIAL PROLOGUE FOR UNIT WHEN THE
 1541                         00,2463  0 0006 1            EXTEND                      LENGTH OF THE ARGUMENT WAS NOT LESS THAN
 1542   REF    4 LAST  90     00,2464  7 7642 1            MP      HALF                .5. IN THIS CASE, EACH COMPONENT MUST BE
 1543   REF   10 LAST  85     00,2465  56 001 0            XCH     L                   SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
 1544   REF    5 LAST  92     00,2466  6 0021 1            AD      SR                  VECTOR.
 1545   REF   11 LAST  92     00,2467  56 001 0            XCH     L
 1546   REF    1              00,2470  1 2513 0            TCF     GENDDV +1           WITH DP DIVIDEND IN A,L.

 1547                         00,2471  20 001 1            DDOUBL                      PROLOGUE WHICH NORMALIZES THE DIVIDEND
 1548                         00,2472  20 001 1            DDOUBL                      WHEN IT IS KNOWN THAT NO DIVISION
 1549                         00,2473  20 001 1            DDOUBL                      OVERFLOW WILL OCCUR.
 1550                         00,2474  20 001 1            DDOUBL
 1551                         00,2475  20 001 1            DDOUBL
 1552                         00,2476  20 001 1            DDOUBL
 1553                         00,2477  20 001 1            DDOUBL
 1554                         00,2500  20 001 1            DDOUBL
 1555                         00,2501  20 001 1            DDOUBL
 1556                         00,2502  20 001 1            DDOUBL
 1557                         00,2503  20 001 1            DDOUBL
 1558                         00,2504  20 001 1            DDOUBL
 1559                         00,2505  20 001 1            DDOUBL
 1560   REF 204 LAST  91      00,2506  52 141 1            DXCH    MPAC

 1561   REF    3 LAST  90     00,2507  10 124 1  MAXTEST   CCS     MAXDVSW             0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
 1562                         00,2510   06552 0  BIASHI    DEC     .4192 B-1           SQRT CONSTANTS

 1563   REF    1              00,2511  1 2564 0            TCF     MAXDV               CHECK TO SEE IF THEY ARE NOW EQUAL.
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P1564           THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R1566   THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R1567           1.  THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1568           2.  THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R1570   (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1572           UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R1574   TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R1576   ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1578           A + SB .        (R - QD)                                                A + SB
R1580           ------ = Q + S(------) WHERE Q AND R ARE QUOTIENT AND REMAINDER OF ------ RESPECTIVELY.
R1582           C + SD          (  C   )                                                  C


 1584   REF 205 LAST  92     00,2512  52 141 1  GENDDV   DXCH    MPAC              WE NEED A AND B ONLY FOR FIRST DV.
 1585                        00,2513  0 0006 1    +1     EXTEND                    (SPECIAL UNIT PROLOGUE ENTERS HERE).
 1586   REF  33 LAST  91     00,2514  10 114 1           DV      BUF               A NOW CONTAINS Q AND L, R.
 1587   REF 206 LAST  93     00,2515  52 141 1           DXCH    MPAC

 1588   REF 207 LAST  93     00,2516  4 0140 0           CS      MPAC              FORM DIVIDEND FOR MINOR PART OF RESULT.
 1589                        00,2517  0 0006 1           EXTEND
 1590   REF  34 LAST  93     00,2520  7 0115 0           MP      BUF +1
 1591   REF 208 LAST  93     00,2521  6 0141 0           AD      MPAC +1           OVERFLOW AT THIS POINT IS POSITIVE SINCE
 1592                        00,2522  54 000 0           OVSK                      R IS POSITIVE IN EVERY CASE.
 1593                        00,2523  1 2530 1           TCF     +5

 1594                        00,2524  0 0006 1           EXTEND                    OVERFLOW CAN BE REMOVED BY SUBTRACTING C
 1595   REF  35 LAST  93     00,2525  60 114 0           SU      BUF               (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
 1596   REF 209 LAST  93     00,2526  24 140 1           INCR    MPAC              IN THIS CASE, INCR COMPENSATES SUBTRACT,
 1597   REF   1              00,2527  1 2532 0           TCF     +DOWN             (SINCE C(A) IS STILL POSITIVE).

 1598                        00,2530  0 0006 1    +5     EXTEND                    C(A) CAN BE MADE LESS THAN C IN MAGNI-
 1599   REF   1              00,2531  6 2542 0           BZMF    -UP               TUDE BY DIMINISHING IT BY C (SINCE C IS
A1600                                                                              NOT LESS THAN .5) UNLESS C(A) = 0.
```

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L        LIST-PROCESSING INTERPRETER                                                          USER'S OWN PAGE NO. 61

 1601                          00,2532   0 0006 1   +DOWN      EXTEND
 1602   REF  36 LAST  93       00,2533  60 114  0              SU       BUF             IF POSITIVE, REDUCE ONLY IF NECESSARY
 1603                          00,2534   0 0006 1              EXTEND                   SINCE THE COMPENSATING INCR MIGHT CAUSE
 1604                          00,2535   1 2540 0              BZF      +3              OVERFLOW.
 1605                          00,2536   0 0006 1              EXTEND                   DONT SUBTRACT UNLESS RESULT IS POSITIVE
 1606   REF   1                00,2537   6 2546 1              BZMF     ENDMAXDV        OR ZERO.

 1607   REF 210 LAST  93       00,2540  24 140  1    +3        INCR     MPAC            KEEP SUBTRACT HERE AND COMPENSATE.
 1608   REF   2 LAST  88       00,2541   1 2547 1              TCF      FINALDV

 1609                          00,2542   0 0006 1   -UP        EXTEND                   IF ZERO, SET MINOR PART OF RESULT TO
 1610   REF   3 LAST  94       00,2543   1 2552 0              BZF      FINALDV +3      ZERO.

 1611                          00,2544   0 0006 1              EXTEND                   IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
 1612   REF 211 LAST  94       00,2545  26 140  0              DIM      MPAC            TO COMPENSATE. DIM IS OK HERE SINCE THE
 1613   REF  37 LAST  94       00,2546   6 0114 0   ENDMAXDV   AD       BUF             MAJOR PART NEVER GOES NEGATIVE.
 1614                          00,2547  22 007 0  FINALDV  ZL                       DO DV TO OBTAIN MINOR PART OF RESULT.
 1615                          00,2550  0 0006 1           EXTEND
 1616    REF  38 LAST  94      00,2551  10 114 1           DV      BUF
 1617    REF 212 LAST  94      00,2552  54 141 1    +3     TS      MPAC +1

 1618    REF   4 LAST  89      00,2553  10 122 1           CCS     DVSIGN           LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
 1619    REF  45 LAST  85      00,2554  0 0002 0           TC      Q                -0.
 1620    REF  46 LAST  95      00,2555  0 0002 0           TC      Q
 1621    REF  47 LAST  95      00,2556  0 0002 0           TC      Q

 1622                          00,2557  0 0006 1           EXTEND
 1623    REF 213 LAST  95      00,2560  4 0141 1           DCS     MPAC
 1624    REF 214 LAST  95      00,2561  52 141 1           DXCH    MPAC
 1625    REF  20 LAST  90      00,2562  3 7665 0           CAF     ZERO             SO WE ALWAYS RETURN WITH C(A) = 0.
 1626    REF  48 LAST  95      00,2563  0 0002 0           TC      Q
```

```
P1627           IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1629   DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1631   ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

R1633                         C + SB .           (C + B - D)
R1634                         ------ = 37777 + S(----------)
R1635                         C + SD             (    C     )

R1636           THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.


 1638   REF 215 LAST  95      00,2564  4 0140 0  MAXDV    CS      MPAC             SEE IF MAXDV CASE STILL HOLDS AFTER
 1639   REF  39 LAST  95      00,2565  6 0114 0           AD      BUF              NORMALIZATION.
 1640                         00,2566  0 0006 1           EXTEND
 1641                         00,2567  1 2571 1           BZF     +2
 1642   REF   2 LAST  92      00,2570  1 2512 1           TCF     GENDDV           MPAC NOW LESS THAN BUF - DIVIDE AS USUAL

 1643   REF   7 LAST  90      00,2571  3 7637 1  +2       CAF     POSMAX           SET MAJOR PART OF RESULT.
 1644   REF 216 LAST  96      00,2572  54 140 0           TS      MPAC

 1645   REF  40 LAST  96      00,2573  4 0115 0           CS      BUF +1           FORM DIVIDEND OF MINOR PART OF RESULT.
 1646   REF 217 LAST  96      00,2574  6 0141 0           AD      MPAC +1
 1647   REF   2 LAST  94      00,2575  1 2546 0           TCF     ENDMAXDV         GO ADD C AND DO DIVIDE, ATTACHING SIGN
A1648                                                                              BEFORE EXITING.
```

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P1649              VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

 1651    REF   8 LAST  88      00,2576  4 7657 0  V/SC2     CS       ONE                INITIALIZE DIVIDEND NORMALIZATION COUNT
 1652    REF   4 LAST  91      00,2577  54 123 0            TS       DVNORMCT           AND DIVISION SIGN REGISTER.
 1653    REF  31 LAST  77      00,2600  54 113 0            TS       VBUF +5

 1654    REF  41 LAST  96      00,2601  10 114 1            CCS      BUF                FORCE DIVISOR POSITIVE WITH MAJOR PART
 1655    REF   1               00,2602  1 2637 0            TCF      /BUF+              NON-ZERO (IF POSSIBLE).
 1656                          00,2603  1 2605 1            TCF      +2
 1657    REF   1               00,2604  1 2633 1            TCF      /BUF-

 1658    REF  42 LAST  97      00,2605  56 115 1            XCH      BUF +1             SHIFT VECTOR AND SCALAR LEFT 14.
 1659    REF  43 LAST  97      00,2606  56 114 0            XCH      BUF
 1660    REF 218 LAST  96      00,2607  56 141 0            XCH      MPAC +1
 1661    REF 219 LAST  97      00,2610  56 140 1            XCH      MPAC
 1662                          00,2611  0 0006 1            EXTEND                      CHECK FOR OVERFLOW IN EACH CASE.
 1663                          00,2612  1 2614 1            BZF      +2
 1664    REF   5 LAST  90      00,2613  1 2355 1            TCF      DVOVF

 1665    REF 220 LAST  97      00,2614  56 144 0            XCH      MPAC +4
 1666    REF 221 LAST  97      00,2615  56 143 1            XCH      MPAC +3
 1667                          00,2616  0 0006 1            EXTEND
 1668                          00,2617  1 2621 1            BZF      +2
 1669    REF   6 LAST  97      00,2620  1 2355 1            TCF      DVOVF

 1670    REF 222 LAST  97      00,2621  56 146 1            XCH      MPAC +6
 1671    REF 223 LAST  97      00,2622  56 145 1            XCH      MPAC +5
 1672                          00,2623  0 0006 1            EXTEND
 1673                          00,2624  1 2626 0            BZF      +2
 1674    REF   7 LAST  97      00,2625  1 2355 1            TCF      DVOVF

 1675    REF  44 LAST  97      00,2626  10 114 1            CCS      BUF
 1676    REF   2 LAST  97      00,2627  1 2637 0            TCF      /BUF+
 1677    REF   8 LAST  97      00,2630  1 2355 1            TCF      DVOVF              ZERO DIVISOR - OVERFLOW.
 1678    REF   2 LAST  97      00,2631  1 2633 1            TCF      /BUF-
 1679    REF   9 LAST  97      00,2632  1 2355 1            TCF      DVOVF

 1680                          00,2633  0 0006 1  /BUF-     EXTEND                      ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
 1681    REF  45 LAST  97      00,2634  4 0115 0            DCS      BUF                DVSIGN IN VBUF +5.
 1682    REF  46 LAST  97      00,2635  52 115 0            DXCH     BUF
 1683    REF  32 LAST  97      00,2636  24 113 1            INCR     VBUF +5
```

```
1684  REF   5 LAST  92   00,2637  3 7642 0  /BUF+    CAF     HALF          FORCE SIGN AGREEMENT IN DIVISOR.
1685                       00,2640  6 0000 1           DOUBLE
1686  REF  47 LAST  97   00,2641  6 0115 1           AD      BUF +1
1687  REF  48 LAST  98   00,2642  54 115 0           TS      BUF +1
1688  REF  21 LAST  95   00,2643  3 7665 0           CAF     ZERO
1689  REF   8 LAST  96   00,2644  6 7637 1           AD      POSMAX
1690  REF  49 LAST  98   00,2645  26 114 1           ADS     BUF

1691  REF  11 LAST  90   00,2646  56 117 0           XCH     BUF2          LEAVE ABS(ORIGINAL DIVISOR) IN BUF2 FOR
1692  REF  50 LAST  98   00,2647  3 0115 1           CA      BUF +1        OVERFLOW TESTING.
1693  REF  12 LAST  98   00,2650  54 120 0           TS      BUF2 +1
1694  REF   1              00,2651  1 2657 0           TCF     /NORM         NORMALIZE DIVISOR IN BUF.

1695                       00,2652  0 0006 1  /NORM2   EXTEND                IF LESS THAN .5, AUGMENT DVNORMCT AND
1696  REF   5 LAST  97   00,2653  24 123 1           AUG     DVNORMCT      DOUBLE DIVISOR.
1697                       00,2654  0 0006 1           EXTEND
1698  REF  51 LAST  98   00,2655  3 0115 1           DCA     BUF
1699  REF  52 LAST  98   00,2656  20 115 0           DAS     BUF

1700  REF  53 LAST  98   00,2657  3 0114 0  /NORM    CA      BUF           SEE IF DIVISOR NORMALIZED.
1701                       00,2660  6 0000 1           DOUBLE
1702                       00,2661  54 000 0           OVSK
1703  REF   1              00,2662  1 2652 0           TCF     /NORM2        DOUBLE AND TRY AGAIN IF NOT.

1704  REF   1              00,2663  0 2675 1           TC      V/SCDV        DO X COMPONENT DIVIDE.
1705  REF 224 LAST  97   00,2664  52 144 1           DXCH    MPAC +3       SUPPLY ARGUMENTS IN USUAL SEQUENCE.
1706  REF 225 LAST  98   00,2665  52 141 1           DXCH    MPAC
1707  REF 226 LAST  98   00,2666  52 144 1           DXCH    MPAC +3

1708  REF   2 LAST  98   00,2667  0 2675 1           TC      V/SCDV        Y COMPONENT.
1709  REF 227 LAST  98   00,2670  52 146 0           DXCH    MPAC +5
1710  REF 228 LAST  98   00,2671  52 141 1           DXCH    MPAC
1711  REF 229 LAST  98   00,2672  52 146 0           DXCH    MPAC +5

1712  REF   3 LAST  98   00,2673  0 2675 1           TC      V/SCDV        Z COMPONENT.
1713  REF   2 LAST  81   00,2674  1 7373 0           TCF     VROTATEX      GO RE-ARRANGE COMPONENTS BEFORE EXIT.
```

```
P1714            SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC,+1 BY THE SCALAR GIVEN IN BUF.

 1716   REF  33 LAST  97     00,2675  3 0113 1  V/SCDV    CA      VBUF +5          REFLECTS SIGN OF SCALAR.
 1717   REF   5 LAST  95     00,2676  54 122 1            TS      DVSIGN

 1718   REF 230 LAST  98     00,2677  10 140 0            CCS     MPAC             FORCE MPAC POSITIVE, EXITING ON ZERO.
 1719   REF   1              00,2700  1 2714 0            TCF     /MPAC+
 1720                        00,2701  1 2703 0            TCF     +2
 1721   REF   1              00,2702  1 2710 1            TCF     /MPAC-

 1722   REF 231 LAST  99     00,2703  10 141 1            CCS     MPAC +1
 1723   REF   2 LAST  99     00,2704  1 2714 0            TCF     /MPAC+
 1724   REF  49 LAST  95     00,2705  0 0002 0            TC      Q
 1725   REF   2 LAST  99     00,2706  1 2710 1            TCF     /MPAC-
 1726   REF  50 LAST  99     00,2707  0 0002 0            TC      Q

 1727                        00,2710  0 0006 1  /MPAC-    EXTEND                   USUAL COMPLEMENTING AND SETTING OF SIGN.
 1728   REF 232 LAST  99     00,2711  4 0141 1            DCS     MPAC
 1729   REF 233 LAST  99     00,2712  52 141 1            DXCH    MPAC
 1730   REF   6 LAST  99     00,2713  24 122 0            INCR    DVSIGN

 1731   REF   9 LAST  97     00,2714  4 7657 0  /MPAC+    CS      ONE              INITIALIZE NEAR-ONE SWITCH.
 1732   REF   4 LAST  92     00,2715  54 124 1            TS      MAXDVSW

 1733   REF 234 LAST  99     00,2716  4 0140 0            CS      MPAC             CHECK POSSIBLE OVERFLOW.
 1734   REF  13 LAST  98     00,2717  6 0117 0            AD      BUF2             UNNORMALIZED INPUT DIVISOR.
 1735                        00,2720  0 0006 1            EXTEND
 1736   REF   1              00,2721  6 2725 0            BZMF    /AGREE           CHECK FOR NEAR-ONE OR OVERFLOW.

 1737   REF 235 LAST  99     00,2722  52 141 1  DDVCALL   DXCH    MPAC             CALL PRE-DIVIDE NORMALIZATION.
 1738   REF   6 LAST  98     00,2723  50 123 1            INDEX   DVNORMCT
 1739   REF   2 LAST  91     00,2724  1 2507 0            TCF     MAXTEST
```

```
1740  REF   6 LAST  98   00,2725   3 7642 0  /AGREE   CAF     HALF        FORCE SIGN AGREEMENT IN DIVIDEND
1741                      00,2726   6 0000 1           DOUBLE              (ALREADY DONE FOR DIVISOR).
1742  REF 236 LAST  99    00,2727   6 0141 0           AD      MPAC +1
1743  REF 237 LAST 100    00,2730  54 141 1            TS      MPAC +1
1744  REF  22 LAST  98    00,2731   3 7665 0           CAF     ZERO
1745  REF   9 LAST  98    00,2732   6 7637 1           AD      POSMAX
1746  REF 238 LAST 100    00,2733  26 140 0            ADS     MPAC

1747  REF 239 LAST 100    00,2734   4 0140 0           CS      MPAC        CHECK TO SEE IF OVERFLOW GONE OR IF
1748  REF  14 LAST  99    00,2735   6 0117 0           AD      BUF2        NEAR-ONE CASE IS PRESENT.
1749  REF  28 LAST  90    00,2736  10 000 0            CCS     A
1750  REF   1             00,2737   1 2722 0           TCF     DDVCALL     NOT NEAR-ONE.
1751                      00,2740    32506 0  SLOPELO  DEC     .8324
1752  REF  10 LAST  97    00,2741   1 2355 1           TCF     DVOVF       NO HOPE.

1753  REF   5 LAST  99    00,2742  54 124 1            TS      MAXDVSW     SIGNAL POSSIBLE NEAR-ONE CASE.
1754  REF 240 LAST 100    00,2743   4 0141 1           CS      MPAC +1     SEE IF DIVISION CAN BE DONE.
1755  REF  15 LAST 100    00,2744   6 0120 1           AD      BUF2 +1
1756                      00,2745   0 0006 1           EXTEND
1757  REF  11 LAST 100    00,2746   6 2355 0           BZMF    DVOVF
1758  REF   2 LAST 100    00,2747   1 2722 0           TCF     DDVCALL     GOING TO MAXDV.
```

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L       LIST-PROCESSING INTERPRETER                                                   USER'S OWN PAGE NO.  68

P1759           THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

  1761  REF   2 LAST  68     00,2750  0 7506 0  UNIT      TC      MPACVBUF          SAVE THE ARGUMENT IN VBUF.
  1762  REF  23 LAST 100     00,2751  3 7665 0            CAF     ZERO              MUST SENSE OVERFLOW IN FOLLOWING DOT.
  1763  REF   6 LAST  80     00,2752  56 105 0            XCH     OVFIND
  1764  REF   3 LAST  11     00,2753  54 125 0            TS      TEM1
  1765  REF   1              00,2754  0 3246 1            TC      VSQSUB            DOT MPAC WITH ITSELF.
  1766  REF   4 LAST 101     00,2755  3 0125 1            CA      TEM1
  1767  REF   7 LAST 101     00,2756  56 105 0            XCH     OVFIND
  1768                       00,2757  0 0006 1            EXTEND
  1769                       00,2760  1 2762 1            BZF     +2
  1770  REF  12 LAST 100     00,2761  1 2355 1            TCF     DVOVF
  1771                       00,2762  0 0006 1            EXTEND
  1772  REF 241 LAST 100     00,2763  3 0141 0            DCA     MPAC              LEAVE THE SQUARE OF THE LENGTH OF THE
  1773  REF  10 LAST  55     00,2764  50 104 1            INDEX   FIXLOC            ARGUMENT IN LVSQUARE.
  1774  REF   1              00,2765  52 043 1            DXCH    LVSQUARE

  1775  REF   1              00,2766  0 3272 0            TC      SQRTSUB           GO TAKE THE NORMALIZED SQUARE ROOT.

  1776  REF 242 LAST 101     00,2767  10 140 0            CCS     MPAC              CHECK FOR UNIT OVERFLOW.
  1777                       00,2770  1 2775 1            TCF     +5                MPAC IS NOT LESS THAN .5 UNLESS
  1778  REF  12 LAST  92     00,2771  54 001 1            TS      L
  1779  REF  11 LAST 101     00,2772  50 104 1            INDEX   FIXLOC
  1780  REF   1              00,2773  52 045 1            DXCH    LV
  1781  REF  13 LAST 101     00,2774  1 2355 1            TCF     DVOVF             INPUT TO SQRTSUB WAS 0.

  1782  REF   1              00,2775  4 3076 1            CS      FOURTEEN          SEE IF THE INPUT WAS SO SMALL THE THE
  1783  REF  42 LAST  87     00,2776  6 0121 0            AD      MPTEMP            FIRST TWO REGISTERS OF THE SQUARE WERE 0
  1784  REF  29 LAST 100     00,2777  10 000 0            CCS     A
  1785                       00,3000  4 0000 0            COM                       IF SO, SAVE THE NEGATIVE OF THE SHIFT
  1786  REF   1              00,3001  1 3057 1            TCF     SMALL             COUNT -15D.

  1787  REF   1              00,3002  1 3011 0            TCF     LARGE             (THIS IS USUALLY THE CASE.)

  1788  REF   1              00,3003  4 3075 1            CS      THIRTEEN          IF THE SHIFT COUNT WAS EXACTLY 14, SET
  1789  REF  43 LAST 101     00,3004  54 121 1            TS      MPTEMP            THE PRE-DIVIDE NORM COUNT TO -13D.

  1790  REF 243 LAST 101     00,3005  3 0140 1            CA      MPAC              SHIFT THE LENGTH RIGHT 14 BEFORE STORING
  1791  REF  13 LAST 101     00,3006  54 001 1  SMALL2    TS      L                 (SMALL EXITS TO THIS POINT).
  1792  REF  24 LAST 101     00,3007  3 7665 0            CAF     ZERO
  1793  REF   1              00,3010  1 3036 0            TCF     LARGE2            GO TO STORE LENGTH AND PROCEED.

  1794  REF  44 LAST 101     00,3011  10 121 1  LARGE     CCS     MPTEMP            MOST ALL CASES COME HERE.
  1795  REF   1              00,3012  1 3020 1            TCF     LARGE3            SEE IF NO NORMALIZATION WAS REQUIRED BY

  1796  REF   1              00,3013  4 2005 1            CS      SRDDV             SQRT, AND IF SO, SET UP FOR A SHIFT
  1797  REF  45 LAST 101     00,3014  54 121 1            TS      MPTEMP            RIGHT 1 BEFORE DIVIDING TO PRODUCE
  1798                       00,3015  0 0006 1            EXTEND                    THE DESIRED HALF UNIT VECTOR.
  1799  REF 244 LAST 101     00,3016  3 0141 0            DCA     MPAC
  1800  REF   2 LAST 101     00,3017  1 3036 0            TCF     LARGE2
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```
1801                      00,3020  4 0000 0  LARGE3  COM                    LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
1802  REF  46 LAST 101    00,3021  54 121 1          TS       MPTEMP        PREDIVIDE LEFT SHIFT.

1803                      00,3022  4 0000 0          COM                    PICK UP REQUIRED SHIFTING BIT TO UNNORM-
1804  REF  30 LAST 101    00,3023  50 000 1          INDEX    A             ALIZE THE SQRT RESULT.
1805  REF   5 LAST  86    00,3024  3 7642 0          CAF      BIT14
1806  REF  54 LAST  98    00,3025  54 114 1          TS       BUF
1807                      00,3026  0 0006 1          EXTEND
1808  REF 245 LAST 101    00,3027  7 0141 1          MP       MPAC +1
1809  REF  55 LAST 102    00,3030  56 114 0          XCH      BUF
1810                      00,3031  0 0006 1          EXTEND                 (UNNORMALIZE THE SQRT FOR LV).
1811  REF 246 LAST 102    00,3032  7 0140 0          MP       MPAC
1812  REF  14 LAST 101    00,3033  56 001 0          XCH      L
1813  REF  56 LAST 102    00,3034  6 0114 0          AD       BUF
1814  REF  15 LAST 102    00,3035  56 001 0          XCH      L

1815  REF  12 LAST 101    00,3036  50 104 1  LARGE2  INDEX    FIXLOC
1816  REF   2 LAST 101    00,3037  52 045 1          DXCH     LV            LENGTH NOW STORED IN WORK AREA.

1817  REF  10 LAST  99    00,3040  4 7657 0          CS       ONE
1818  REF   6 LAST 100    00,3041  54 124 1          TS       MAXDVSW       NO MAXDV CASES IN UNIT.

1819  REF  34 LAST  99    00,3042  52 107 0          DXCH     VBUF          PREPARE X COMPONENT FOR DIVIDE, SETTING
1820  REF 247 LAST 102    00,3043  52 141 1          DXCH     MPAC          LENGTH OF VECTOR AS DIVISOR IN BUF.
1821  REF  57 LAST 102    00,3044  52 115 0          DXCH     BUF
1822  REF   1             00,3045  0 3077 1          TC       UNITDV

1823  REF  35 LAST 102    00,3046  52 111 1          DXCH     VBUF +2       DO Y AND Z IN USUAL FASHION SO WE CAN
1824  REF 248 LAST 102    00,3047  52 141 1          DXCH     MPAC          EXIT THROUGH VROTATEX.
1825  REF 249 LAST 102    00,3050  52 144 1          DXCH     MPAC +3
1826  REF   2 LAST 102    00,3051  0 3077 1          TC       UNITDV

1827  REF  36 LAST 102    00,3052  52 113 0          DXCH     VBUF +4
1828  REF 250 LAST 102    00,3053  52 141 1          DXCH     MPAC
1829  REF 251 LAST 102    00,3054  52 146 0          DXCH     MPAC +5
1830  REF   3 LAST 102    00,3055  0 3077 1          TC       UNITDV
1831  REF   3 LAST  98    00,3056  1 7373 0          TCF      VROTATEX      AND EXIT.
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P1832             IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1834   14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.
 1836   REF  47 LAST 102    00,3057  54 121 1  SMALL    TS     MPTEMP        NEGATIVE OF PRE-DIVIDE SHIFT COUNT.
 1837   REF  25 LAST 101    00,3060  3 7665 0           CAF    ZERO          SHIFT EACH COMPONENT LEFT 14.
 1838   REF  37 LAST 102    00,3061  56 107 1           XCH    VBUF +1
 1839   REF  38 LAST 103    00,3062  56 106 0           XCH    VBUF
 1840   REF  39 LAST 103    00,3063  56 111 0           XCH    VBUF +3
 1841   REF  40 LAST 103    00,3064  56 110 1           XCH    VBUF +2
 1842   REF  41 LAST 103    00,3065  56 113 1           XCH    VBUF +5
 1843   REF  42 LAST 103    00,3066  56 112 0           XCH    VBUF +4

 1844   REF  48 LAST 103    00,3067  4 0121 1           CS     MPTEMP
 1845   REF  31 LAST 102    00,3070  50 000 1           INDEX  A
 1846   REF   6 LAST 102    00,3071  3 7642 0           CAF    BIT14
 1847                       00,3072  0 0006 1           EXTEND
 1848   REF 252 LAST 102    00,3073  7 0140 0           MP     MPAC
 1849   REF   1             00,3074  1 3006 0           TCF    SMALL2

 1850                       00,3075  00015 0  THIRTEEN  DEC    13
 1851                       00,3076  00016 0  FOURTEEN  DEC    14
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L       LIST-PROCESSING INTERPRETER                                                          USER'S OWN PAGE NO.  71

P1852              THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

 1853   REF 253 LAST 103      00,3077  10 140 0  UNITDV   CCS     MPAC              FORCE MPAC POSITIVE IF POSSIBLE, SETTING
 1854   REF   1               00,3100   1 3116 0          TCF     UMPAC+            DVSIGN ACCORDING TO THE SIGN OF MPAC
 1855                         00,3101   1 3103 1          TCF     +2                SINCE THE DIVISOR IS ALWAYS POSITIVE
 1856   REF   1               00,3102   1 3110 0          TCF     UMPAC-            HERE.

 1857   REF 254 LAST 104      00,3103  10 141 1           CCS     MPAC +1
 1858   REF   2 LAST 104      00,3104   1 3116 0          TCF     UMPAC+
 1859   REF  51 LAST  99      00,3105   0 0002 0          TC      Q                 EXIT IMMEDIATELY ON ZERO.
 1860   REF   2 LAST 104      00,3106   1 3110 0          TCF     UMPAC-
 1861   REF  52 LAST 104      00,3107   0 0002 0          TC      Q

 1862   REF  26 LAST 103      00,3110   4 7665 1  UMPAC-   CS      ZERO              IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
 1863   REF   7 LAST  99      00,3111  54 122 1           TS      DVSIGN            COMPLEMENT.
 1864                         00,3112   0 0006 1          EXTEND
 1865   REF 255 LAST 104      00,3113   4 0141 1          DCS     MPAC              PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
 1866   REF  49 LAST 103      00,3114  50 121 0           INDEX   MPTEMP
 1867   REF   3 LAST  99      00,3115   1 2506 1          TCF     MAXTEST -1

 1868   REF   8 LAST 104      00,3116  54 122 1  UMPAC+   TS      DVSIGN            SET DVSIGN FOR POSITIVE QUOTIENT.
 1869   REF 256 LAST 104      00,3117  52 141 1           DXCH    MPAC
 1870   REF  50 LAST 104      00,3120  50 121 0           INDEX   MPTEMP
 1871   REF   4 LAST 104      00,3121   1 2506 1          TCF     MAXTEST -1
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P1872          MISCELLANEOUS UNARY OPERATIONS.

 1873   REF   1              00,3122  0 3227 0  DSQ       TC       DSQSUB           SQUARE THE DP CONTENTS OF MPAC.
 1874   REF  30 LAST  91     00,3123  1 6014 0            TCF      DANZIG

 1875   REF  19 LAST  87     00,3124 10 147 1   ABVALABS  CCS      MODE             ABVAL OR ABS INSTRUCTION.
 1876   REF   1              00,3125  1 3154 0            TCF      ABS              DO ABS ON SCALAR.
 1877   REF   2 LAST 105     00,3126  1 3154 0            TCF      ABS

 1878   REF   2 LAST 101     00,3127  0 3246 1  ABVAL     TC       VSQSUB           DOT MPAC WITH ITSELF.
 1879   REF  20 LAST 105     00,3130 22 147 0             LXCH     MODE             MODE IS NOW DP (L ZERO AFTER DAS).

 1880                        00,3131  0 0006 1            EXTEND                    STORE SQUARE OF LENGTH IN WORK AREA.
 1881   REF 257 LAST 104     00,3132  3 0141 0            DCA      MPAC
 1882   REF  13 LAST 102     00,3133 50 104 1             INDEX    FIXLOC
 1883   REF   2 LAST 101     00,3134 52 043 1             DXCH     LVSQUARE

 1884   REF   2 LAST 101     00,3135  0 3272 0  SQRT      TC       SQRTSUB          TAKE THE SQUARE ROOT OF MPAC.
 1885   REF  51 LAST 104     00,3136 10 121 1             CCS      MPTEMP           RETURNED NORMALIZED SQUARE ROOT. SEE IF
 1886                        00,3137  1 3141 1            TCF      +2               ANY UN-NORMALIZATION REQUIRED AND EXIT
 1887   REF  31 LAST 105     00,3140  1 6014 0            TCF      DANZIG           IF NOT.

 1888   REF   3 LAST  86     00,3141  6 2273 0            AD       NEG12            A RIGHT SHIFT OF MORE THAN 13 COULD BE
 1889                        00,3142  0 0006 1            EXTEND                    REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
 1890   REF   1              00,3143  6 3147 0            BZMF     SQRTSHFT         GOES HERE IN MOST CASES.
 1891                        00,3144 22 007 0             ZL                        IF A LONG SHIFT IS REQUIRED, GO TO
 1892   REF  76 LAST  87     00,3145 22 102 1             LXCH     ADDRWD           GENERAL RIGHT SHIFT ROUTINES.
 1893   REF   4 LAST  86     00,3146  1 2263 0            TCF      GENSCR +4        ADDRWD WAS ZERO TO PREVENT ROUND.

 1894   REF  52 LAST 105     00,3147 50 121 0   SQRTSHFT  INDEX    MPTEMP           SELECT SHIFTING BIT AND EXIT THROUGH
 1895   REF   5 LAST  77     00,3150  3 7641 0            CAF      BIT15            SHIFT ROUTINES.
 1896   REF  53 LAST 105     00,3151 54 121 1             TS       MPTEMP
 1897   REF  27 LAST 104     00,3152  3 7665 0            CAF      ZERO             TO ZERO MPAC +2 IN THE PROCESS.
 1898   REF   2 LAST  86     00,3153  1 2017 1            TCF      MPACSHR +3

 1899   REF   3 LAST  83     00,3154  0 6711 0  ABS       TC       BRANCH           TEST SIGN OF MPAC AND COMPLEMENT IF
 1900   REF  32 LAST 105     00,3155  1 6014 0            TCF      DANZIG
 1901   REF  33 LAST 105     00,3156  1 6014 0            TCF      DANZIG
 1902   REF   4 LAST  75     00,3157  1 7616 0            TCF      COMP
 1903   REF   2 LAST  70    00,3160  4 7655 1  VDEF     CS      FOUR           VECTOR DEFINE - ESSENTIALLY TREATS
 1904   REF  13 LAST  73    00,3161  26 152 0           ADS     PUSHLOC        SCALAR IN MPAC AS X COMPONENT, PUSHES UP
 1905                       00,3162  0 0006 1           EXTEND                 FOR Y AND THEN AGAIN FOR Z.
 1906   REF  32 LAST 103    00,3163  5 0000 1           INDEX   A
 1907                       00,3164  3 0003 1           DCA     2
 1908   REF 258 LAST 105    00,3165  52 144 1           DXCH    MPAC +3
 1909                       00,3166  0 0006 1           EXTEND
 1910   REF  14 LAST 106    00,3167  5 0152 1           INDEX   PUSHLOC
 1911                       00,3170  3 0001 0           DCA     0
 1912   REF 259 LAST 106    00,3171  52 146 0           DXCH    MPAC +5
 1913   REF  11 LAST 102    00,3172  4 7657 0           CS      ONE            MODE IS NOW VECTOR.
 1914   REF   7 LAST  78    00,3173  1 6013 1           TCF     NEWMODE

 1915   REF   3 LAST 105    00,3174  0 3246 1  VSQ      TC      VSQSUB         DOT MPAC WITH ITSELF.
 1916   REF  28 LAST 105    00,3175  3 7665 0           CAF     ZERO
 1917   REF   8 LAST 106    00,3176  1 6013 1           TCF     NEWMODE        MODE IS NOW DP.

 1918                       00,3177  0 0006 1  PUSH     EXTEND                 PUSH DOWN MPAC LEAVING IT LOADED.
 1919   REF 260 LAST 106    00,3200  3 0141 0           DCA     MPAC
 1920   REF  15 LAST 106    00,3201  50 152 1           INDEX   PUSHLOC        PUSH DOWN FIRST TWO REGISTERS IN EACH
 1921                       00,3202  52 001 1           DXCH    0

 1922   REF  21 LAST 105    00,3203  50 147 0           INDEX   MODE           INCREMENT PUSHDOWN POINTER.
 1923   REF   6 LAST  76    00,3204  3 6164 1           CAF     NO.WDS
 1924   REF  16 LAST 106    00,3205  26 152 0           ADS     PUSHLOC

 1925   REF  22 LAST 106    00,3206  10 147 1           CCS     MODE
 1926   REF   1             00,3207  1 3222 1           TCF     TPUSH          PUSH DOWN MPAC +2.
 1927   REF  34 LAST 105    00,3210  1 6014 0           TCF     DANZIG         DONE FOR DP.

 1928                       00,3211  0 0006 1           EXTEND                 ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
 1929   REF 261 LAST 106    00,3212  3 0144 0           DCA     MPAC +3
 1930   REF  17 LAST 106    00,3213  50 152 1           INDEX   PUSHLOC
 1931                       00,3214  51'775 0           DXCH    0 -4
 1932                       00,3215  0 0006 1           EXTEND
 1933   REF 262 LAST 106    00,3216  3 0146 1           DCA     MPAC +5
 1934   REF  18 LAST 106    00,3217  50 152 1           INDEX   PUSHLOC
 1935                       00,3220  51'777 1           DXCH    0 -2
 1936   REF  35 LAST 106    00,3221  1 6014 0           TCF     DANZIG

 1937   REF 263 LAST 106    00,3222  3 0142 0  TPUSH    CA      MPAC +2
 1938   REF   2 LAST  51    00,3223  1 6560 0           TCF     ENDTPUSH +2

 1939   REF  14 LAST 105    00,3224  50 104 1  RVQ      INDEX   FIXLOC         RVQ - RETURN IVA QPRET.
 1940   REF   2 LAST  54    00,3225  3 0052 0           CA      QPRET
 1941   REF   4 LAST  55    00,3226  1 6652 1           TCF     GOTO +1
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P1942          THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1944     SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.
 1945  REF 264 LAST 106     00,3227  3 0141 0  DSQSUB   CA      MPAC +1          SQUARES THE SCALAR CONTENTS OF MPAC.
 1946                       00,3230  0 0006 1           EXTEND
 1947                       00,3231  7 0000 0           SQUARE
 1948  REF 265 LAST 107     00,3232 54 142 1            TS      MPAC +2
 1949  REF  29 LAST 106     00,3233  3 7665 0           CAF     ZERO             FORM 2(CROSS TERM).
 1950  REF 266 LAST 107     00,3234 56 141 0            XCH     MPAC +1
 1951                       00,3235  0 0006 1           EXTEND
 1952  REF 267 LAST 107     00,3236  7 0140 0           MP      MPAC
 1953                       00,3237 20 001 1            DDOUBL                   AND MAYBE OVERFLOW.
 1954  REF 268 LAST 107     00,3240 20 142 1            DAS     MPAC +1          AND SET A TO NET OVERFLOW.
 1955  REF 269 LAST 107     00,3241 56 140 1            XCH     MPAC
 1956                       00,3242  0 0006 1           EXTEND
 1957                       00,3243  7 0000 0           SQUARE
 1958  REF 270 LAST 107     00,3244 20 141 1            DAS     MPAC
 1959  REF  53 LAST 104     00,3245  0 0002 0           TC      Q

 1960                       00,3246  0 0006 1  VSQSUB   EXTEND                   DOTS THE VECTOR IN MPAC WITH ITSELF.
 1961  REF   8 LAST  63     00,3247 22 123 1            QXCH    DOTRET
 1962  REF   2 LAST 105     00,3250  0 3227 0           TC      DSQSUB           SQUARE THE X COMPONENT.
 1963  REF 271 LAST 107     00,3251 52 144 1            DXCH    MPAC +3
 1964  REF 272 LAST 107     00,3252 52 141 1            DXCH    MPAC
 1965  REF  58 LAST 102     00,3253 52 115 0            DXCH    BUF              SO WE CAN END IN DOTSUB.
 1966  REF 273 LAST 107     00,3254  3 0142 0           CA      MPAC +2
 1967  REF  59 LAST 107     00,3255 54 116 0            TS      BUF +2

 1968  REF   3 LAST 107     00,3256  0 3227 0           TC      DSQSUB           SQUARE Y COMPONENT.
 1969  REF 274 LAST 107     00,3257 52 142 1            DXCH    MPAC +1
 1970  REF  60 LAST 107     00,3260 20 116 0            DAS     BUF +1
 1971  REF 275 LAST 107     00,3261  6 0140 1           AD      MPAC
 1972  REF  61 LAST 107     00,3262  6 0114 0           AD      BUF
 1973  REF  62 LAST 107     00,3263 54 114 1            TS      BUF
 1974                       00,3264  1 3266 1           TCF     +2
 1975  REF   8 LAST 101     00,3265 54 105 1            TS      OVFIND           IF OVERFLOW.

 1976  REF 276 LAST 107     00,3266 52 146 0            DXCH    MPAC +5
 1977  REF 277 LAST 107     00,3267 52 141 1            DXCH    MPAC
 1978  REF   4 LAST 107     00,3270  0 3227 0           TC      DSQSUB           SQUARE Z COMPONENT.
 1979  REF   1              00,3271  1 7165 0           TCF     ENDDOT           END AS IN DOTSUB.
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P1980          DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R1982   IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R1984   .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.


 1985   REF  30 LAST 107     00,3272  3 7665 0  SQRTSUB  CAF     ZERO               START BY ZEROING RIGHT SHIFT COUNT.
 1986   REF  54 LAST 105     00,3273  54 121 1           TS      MPTEMP

 1987   REF 278 LAST 107     00,3274  10 140 0           CCS     MPAC               CHECK FOR POSITIVE ARGUMENT, SHIFTING
 1988   REF   1              00,3275  1 3333 0           TCF     SMPAC+             FIRST SIGNIFICANT MPAC REGISTER INTO
 1989                        00,3276  1 3300 0           TCF     +2                 MPAC ITSELF.
 1990   REF   1              00,3277  1 3322 0           TCF     SQRTNEG            SEE IF MAG OF ARGUMENT LESS THAN 10(-4).

 1991   REF 279 LAST 108     00,3300  56 142 0           XCH     MPAC +2            MPAC IS ZERO - SHIFT LEFT 14.
 1992   REF 280 LAST 108     00,3301  56 141 0           XCH     MPAC +1
 1993   REF 281 LAST 108     00,3302  54 140 0           TS      MPAC
 1994   REF   2 LAST  77     00,3303  3 7663 0           CAF     SEVEN              AUGMENT RIGHT SHIFT COUNTER.
 1995   REF  55 LAST 108     00,3304  54 121 1           TS      MPTEMP

 1996   REF 282 LAST 108     00,3305  10 140 0           CCS     MPAC               SEE IF MPAC NOW PNZ.
 1997   REF   2 LAST 108     00,3306  1 3333 0           TCF     SMPAC+
 1998                        00,3307  1 3311 0           TCF     +2
 1999   REF   1              00,3310  1 3325 1           TCF     ZEROANS            NEGATIVE BUT LESS THAN 10(-4) IN MAG.

 2000   REF 283 LAST 108     00,3311  56 141 0           XCH     MPAC +1            ZERO - SHIFT LEFT 14 AGAIN.
 2001   REF 284 LAST 108     00,3312  54 140 0           TS      MPAC
 2002   REF   3 LAST 108     00,3313  3 7663 0           CAF     SEVEN              AUGMENT RIGHT SHIFT COUNTER.
 2003   REF  56 LAST 108     00,3314  26 121 1           ADS     MPTEMP

 2004   REF 285 LAST 108     00,3315  10 140 0           CCS     MPAC
 2005   REF   3 LAST 108     00,3316  1 3333 0           TCF     SMPAC+
 2006   REF  54 LAST 107     00,3317  0 0002 0           TC      Q                  SQRT(0) = 0.
 2007   REF   2 LAST 108     00,3320  1 3325 1           TCF     ZEROANS
 2008   REF  55 LAST 108     00,3321  0 0002 0           TC      Q


 2009   REF  33 LAST 106     00,3322  10 000 0  SQRTNEG  CCS     A                  ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
 2010   REF   1              00,3323  1 3331 1           TCF     SQRTABRT           CORRECTED ARGUMENT IS LESS THAN 10(-4)

 2011   REF 286 LAST 108     00,3324  10 141 1           CCS     MPAC +1            IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
 2012   REF  31 LAST 108     00,3325  3 7665 0  ZEROANS  CAF     ZERO               FORCE ANSWER TO ZERO HERE.
 2013   REF   1              00,3326  1 3401 0           TCF     FIXROOT
 2014   REF   2 LAST 108     00,3327  1 3331 1           TCF     SQRTABRT
 2015   REF   2 LAST 108     00,3330  1 3401 0           TCF     FIXROOT

 2016   REF   1              00,3331  0 5446 1  SQRTABRT TC      ABORT
 2017                        00,3332   01302 1           OCT     1302
 2018   REF    1             00,3333  6 2410 0  SMPAC+    AD       -1/2+2           SEE IF ARGUMENT GREATER THAN OR EQUAL TO
 2019                        00,3334  0 0006 1            EXTEND                    .5.
 2020   REF    1             00,3335  6 3404 1            BZMF     SRTEST           IF SO, SEE IF LESS THAN .25.

 2021   REF 287 LAST 108     00,3336  52 141 1            DXCH     MPAC             WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
 2022   REF   6 LAST  92     00,3337  22 021 1            LXCH     SR               SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
 2023                        00,3340  0 0006 1            EXTEND
 2024   REF   7 LAST 100     00,3341  7 7642 1            MP       HALF
 2025   REF 288 LAST 109     00,3342  52 141 1            DXCH     MPAC
 2026   REF   7 LAST 109     00,3343  56 021 1            XCH      SR
 2027   REF 289 LAST 109     00,3344  26 141 1            ADS      MPAC +1          GUARANTEED NO OVERFLOW.

 2028   REF    1             00,3345  3 2274 1  ARGHI     CAF      SLOPEHI          ARGUMENT BETWEEN .25 AND .5. GET A
 2029                        00,3346  0 0006 1            EXTEND                    LINEAR APPROXIMATION FOR THIS RANGE.
 2030   REF 290 LAST 109     00,3347  7 0140 0            MP       MPAC
 2031   REF    1             00,3350  6 2510 1            AD       BIASHI           X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.

 2032   REF  63 LAST 107     00,3351  54 114 1   +4       TS       BUF              X0/2 (ARGLO ENTERS HERE).
 2033   REF 291 LAST 109     00,3352  3 0140 1            CA       MPAC             SINGLE-PRECISION THROUGHOUT.
 2034                        00,3353  22 007 0            ZL
 2035                        00,3354  0 0006 1            EXTEND
 2036   REF  64 LAST 109     00,3355  10 114 1            DV       BUF              (MPAC/2)/(X0/2)
 2037                        00,3356  0 0006 1            EXTEND
 2038   REF   8 LAST 109     00,3357  7 7642 1            MP       HALF
 2039   REF  65 LAST 109     00,3360  26 114 1            ADS      BUF              X1 = X0/2 + .5(MPAC/2)/(X0/2).

 2040                        00,3361  0 0006 1            EXTEND
 2041   REF   9 LAST 109     00,3362  7 7642 1            MP       HALF             FORM UP X1/2.
 2042   REF 292 LAST 109     00,3363  52 141 1            DXCH     MPAC             SAVE AND BRING OUT ARGUMENT.
 2043                        00,3364  0 0006 1            EXTEND                    TAKE DP QUOTIENT WITH X1.
 2044   REF  66 LAST 109     00,3365  10 114 1            DV       BUF
 2045   REF  67 LAST 109     00,3366  54 115 0            TS       BUF +1           SAVE MAJOR PART OF QUOTIENT.
 2046   REF  32 LAST 108     00,3367  3 7665 0            CAF      ZERO             FORM MINOR PART OF QUOTIENT USING
 2047   REF  16 LAST 102     00,3370  56 001 0            XCH      L                (REMAINDER,0).
 2048                        00,3371  0 0006 1            EXTEND
 2049   REF  68 LAST 109     00,3372  10 114 1            DV       BUF
 2050   REF  17 LAST 109     00,3373  54 001 1            TS       L                IN PREPARATION FOR DAS.
 2051   REF  69 LAST 109     00,3374  3 0115 1            CA       BUF +1
 2052   REF 293 LAST 109     00,3375  20 141 1            DAS      MPAC             X2 = X1/2 + (MPAC/2)X1

 2053                        00,3376  0 0006 1            EXTEND                    OVERFLOWS IF ARG. NEAR POSMAX.
 2054   REF    1             00,3377  1 3403 1            BZF      TCQBNK00
 2055   REF  10 LAST 100     00,3400  3 7637 1            CAF      POSMAX
 2056   REF 294 LAST 109     00,3401  54 140 0  FIXROOT   TS       MPAC
 2057   REF 295 LAST 109     00,3402  54 141 1            TS       MPAC +1
 2058   REF  56 LAST 108     00,3403  0 0002 0  TCQBNK00  TC       Q                RETURN TO CALLER TO UNNORMALIZE, ETC.
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L        LIST-PROCESSING INTERPRETER                                                        USER'S OWN PAGE NO.  77

 2059   REF   1                00,3404  6 7643 1  SRTEST    AD      QUARTER          ARGUMENT WAS LESS THAN .5, SEE IF LESS
 2060                          00,3405  0 0006 1            EXTEND                   THAN .25.
 2061   REF   1                00,3406  6 3430 0            BZMF    SQRTNORM         IF SO, BEGIN NORMALIZATION.

 2062   REF 296 LAST 109       00,3407  52 141 1            DXCH    MPAC             IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
 2063   REF   8 LAST 109       00,3410  22 021 1            LXCH    SR               START AT ARGLO.
 2064                          00,3411  0 0006 1            EXTEND
 2065   REF  10 LAST 109       00,3412  7 7642 1            MP      HALF
 2066   REF 297 LAST 110       00,3413  52 141 1            DXCH    MPAC
 2067   REF   9 LAST 110       00,3414  56 021 1            XCH     SR
 2068   REF 298 LAST 110       00,3415  26 141 1            ADS     MPAC +1          NO OVERFLOW.

 2069   REF   1                00,3416  3 2740 0  ARGLO     CAF     SLOPELO          (NORMALIZED) ARGUMENT BETWEEN .125 AND
 2070                          00,3417  0 0006 1            EXTEND                   .25
 2071   REF 299 LAST 110       00,3420  7 0140 0            MP      MPAC
 2072   REF   1                00,3421  6 2250 1            AD      BIASLO
 2073   REF   1                00,3422  1 3351 1            TCF     ARGHI +4         BEGIN SQUARE ROOT.

 2074                          00,3423  0 0006 1  SQRTNM2   EXTEND                   SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
 2075   REF 300 LAST 110       00,3424  3 0142 0            DCA     MPAC +1          COUNT (FOR TERMINAL UNNORMALIZATION).
 2076   REF 301 LAST 110       00,3425  20 142 1            DAS     MPAC +1
 2077   REF 302 LAST 110       00,3426  6 0140 1            AD      MPAC
 2078   REF 303 LAST 110       00,3427  26 140 0            ADS     MPAC             (NO OVERFLOW).

 2079   REF  57 LAST 108       00,3430  24 121 0  SQRTNORM  INCR    MPTEMP           FIRST TIME THROUGH, JUST SHIFT LEFT 1
 2080                          00,3431  0 0006 1            EXTEND                   (PUTS IN EFFECTIVE RIGHT SHIFT SINCE
 2081   REF 304 LAST 110       00,3432  3 0142 0            DCA     MPAC +1          WE WANT MPAC/2).
 2082   REF 305 LAST 110       00,3433  20 142 1            DAS     MPAC +1
 2083   REF 306 LAST 110       00,3434  6 0140 1            AD      MPAC
 2084   REF 307 LAST 110       00,3435  26 140 0            ADS     MPAC             (AGAIN NO OVERFLOW).
 2085                          00,3436  6 0000 1            DOUBLE
 2086   REF   1                00,3437  54 022 0            TS      CYL

 2087   REF   2 LAST 110       00,3440  10 022 0  NORMTEST  CCS     CYL              SEE IF ARGUMENT NOW NORMALIZED AT
 2088   REF   3 LAST 110       00,3441  10 022 0            CCS     CYL              GREATER THAN .125.
 2089   REF   1                00,3442  1 3423 0            TCF     SQRTNM2          NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
 2090   REF   2 LAST 110       00,3443  1 3345 1            TCF     ARGHI            YES - NOW BETWEEN .5 AND .25.
 2091   REF   1                00,3444  1 3416 0            TCF     ARGLO            ARGUMENT NOW BETWEEN .25 AND .125.
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P2092    TRIGONOMETRIC FUNCTION PACKAGE.

R2093              THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2095              1.  SIN                 COMPUTES (1/2)SINE(2 PI MPAC).
R2096              2.  COS                 COMPUTES (1/2)COSINE(2 PI MPAC).

R2097              3.  ASIN                COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2098              4.  ACOS                COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2099    SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE, IE SIN(ASIN(X)) = X.


 2100    REF   4 LAST 105      00,3445  0 6711 0  COSINE   TC       BRANCH          FINDS COSINE USING THE IDENTITY
 2101                          00,3446  1 3451 0           TCF      +3              COS(X) = SIN(PI/2 - ABS(X)).
 2102    REF   1               00,3447  1 3454 0           TCF      PRESINE
 2103    REF   2 LAST 111      00,3450  1 3454 0           TCF      PRESINE

 2104                          00,3451  0 0006 1   +3      EXTEND
 2105    REF 308 LAST 110      00,3452  4 0141 1           DCS      MPAC
 2106    REF 309 LAST 111      00,3453  52 141 1           DXCH     MPAC

 2107    REF   2 LAST 110      00,3454  3 7643 1  PRESINE  CAF      QUARTER         PI/2 SCALED.
 2108    REF 310 LAST 111      00,3455  26 140 0           ADS      MPAC


 2109    REF 311 LAST 111      00,3456  52 141 1  SINE     DXCH     MPAC            DOUBLE ARGUMENT.
 2110                          00,3457  20 001 1           DDOUBL
 2111                          00,3460  54 000 0           OVSK                     SEE IF OVERFLOW PRESENT.
 2112                          00,3461  1 3464 0           TCF      +3              IF NOT, ARGUMENT OK AS IS.

 2113                          00,3462  0 0006 1           EXTEND                   IF SO, WE LOST (OR GAINED) PI, SO
 2114                          00,3463  4 0001 1           DCOM                     COMPLEMENT MPAC USING THE IDENTITY
A2115                                                                               SIN(X-(+)PI) = SIN(-X).
 2116    REF 312 LAST 111      00,3464  52 141 1   +3      DXCH     MPAC
 2117    REF 313 LAST 111      00,3465  3 0140 1           CA       MPAC            SEE IF ARGUMENT GREATER THAN .5 IN
 2118                          00,3466  6 0000 1           DOUBLE                   MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
 2119    REF  18 LAST 109      00,3467  54 001 1           TS       L               .5 (+-PI/2 SCALED) AS FOLLOWS:
 2120    REF   1               00,3470  1 3501 1           TCF      SN1

 2121    REF  34 LAST 108      00,3471  50 000 1           INDEX    A               IF POSITIVE, FORM PI - X, IF NEGATIVE
 2122    REF   1               00,3472  3 7641 0           CAF      NEG1/2 +1       USE -PI - X.
 2123                          00,3473  6 0000 1           DOUBLE
 2124                          00,3474  0 0006 1           EXTEND
 2125    REF 314 LAST 111      00,3475  60 140 1           SU       MPAC            GUARANTEED NO OVERFLOW.
 2126    REF 315 LAST 111      00,3476  54 140 0           TS       MPAC
 2127    REF 316 LAST 111      00,3477  4 0141 1           CS       MPAC +1
 2128    REF 317 LAST 111      00,3500  54 141 1           TS       MPAC +1
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  2129                        00,3501  0 0006 1  SN1      EXTEND                   SET UP TO EVALUATE HASTINGS POLYNOMIAL
  2130   REF 318 LAST 111     00,3502  3 0141 0           DCA      MPAC
  2131   REF  16 LAST 100     00,3503  52 120 0           DXCH     BUF2
  2132   REF   5 LAST 107     00,3504  0 3227 0           TC       DSQSUB          SQUARE MPAC.

  2133   REF   1              00,3505  0 7202 0           TC       POLY            EVALUATE FOURTH ORDER POLYNOMIAL.
  2134                        00,3506   00003 1           DEC      3
  2135                        00,3507   14441 0           2DEC     +.3926990796
 C2135                        00,3510   37325 1
  2136                        00,3511   53250 0           2DEC     -.6459637111
 C2136                        00,3512   60764 1
  2137                        00,3513   12146 1           2DEC     +.318758717
 C2137                        00,3514   21276 1
  2138                        00,3515   75466 1           2DEC     -.074780249
 C2138                        00,3516   71471 0
  2139                        00,3517   00236 0           2DEC     +.009694988
 C2139                        00,3520   32757 0
  2140   REF   1              00,3521  3 2434 0           CAF      LBUF2           MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
  2141   REF  19 LAST  73     00,3522  0 7066 0           TC       DMPSUB -1

  2142                        00,3523  0 0006 1           EXTEND
  2143   REF 319 LAST 112     00,3524  3 0142 0           DCA      MPAC +1
  2144   REF 320 LAST 112     00,3525  20 142 1           DAS      MPAC +1
  2145   REF 321 LAST 112     00,3526  6 0140 1           AD       MPAC
  2146   REF 322 LAST 112     00,3527  26 140 0           ADS      MPAC            NEITHER SHIFT OVERFLOWS.
  2147                        00,3530  0 0006 1           EXTEND
  2148   REF 323 LAST 112     00,3531  3 0142 0           DCA      MPAC +1
  2149   REF 324 LAST 112     00,3532  20 142 1           DAS      MPAC +1
  2150   REF 325 LAST 112     00,3533  6 0140 1           AD       MPAC
  2151   REF 326 LAST 112     00,3534  26 140 0           ADS      MPAC
  2152   REF  36 LAST 106     00,3535  1 6014 0           TCF      DANZIG
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P2153           ARCSIN/ARCCOS ROUTINE.

 2154   REF    1             00,3536  3 3557 0  ARCSIN   CAF    LASINEX          COMPUTE ARCSIN BY USING THE IDENTITY
 2155                        00,3537  1 3541 0           TCF    +2               ARCSIN(X) = PI/2 - ARCCOS(X).

 2156   REF    1             00,3540  3 3641 1  ARCCOS   CAF    LDANZIG          (EXITS IMMEDIATELY).
 2157   REF    1             00,3541  54 122 1           TS     ESCAPE
 2158   REF    5 LAST 111    00,3542  0 6711 0           TC     BRANCH           TEST SIGN OF INPUT.
 2159   REF    1             00,3543  1 3553 0           TCF    ACOSST           START IMMEDIATELY IF POSITIVE.
 2160   REF    1             00,3544  1 3655 0           TCF    ACOSZERO         ARCCOS(0) = PI/2 = .25.
 2161                        00,3545  0 0006 1           EXTEND                  IF NEGATIVE, USE THE IDENTITY
 2162   REF 327 LAST 112     00,3546  4 0141 1           DCS    MPAC             ARCCOS(X) = PI - ARCCOS(-X), FORCING
 2163   REF 328 LAST 113     00,3547  52 141 1           DXCH   MPAC             ARGUMENT POSITIVE.
 2164   REF    1             00,3550  3 2247 1           CAF    TCSUBTR          SET EXIT  TO DO ABOVE BEFORE
 2165   REF    2 LAST 113    00,3551  56 122 0           XCH    ESCAPE           ARCSIN/ARCCOS CONSIDERATIONS.
 2166   REF    1             00,3552  54 123 0           TS     ESCAPE2

 2167   REF   11 LAST 110    00,3553  4 7642 1  ACOSST   CS     HALF             TEST MAGNITUDE OF INPUT.
 2168   REF 329 LAST 113     00,3554  6 0140 1           AD     MPAC
 2169   REF   35 LAST 111    00,3555  10 000 0           CCS    A
 2170   REF    1             00,3556  1 3647 0           TCF    ACOSOVF          THIS IS PROBABLY AN OVERFLOW CASE.

 2171   REF    1             00,3557  1 3635 0  LASINEX  TCF    ASINEX

 2172   REF    1             00,3560  1 3570 1           TCF    ACOSST2          NO OVERFLOW - PROCEED.

 2173   REF 330 LAST 113     00,3561  10 141 1           CCS    MPAC +1          IF MAJOR PART IS .5, CALL ANSWER 0
 2174   REF   33 LAST 109    00,3562  3 7665 0           CAF    ZERO             UNLESS MINOR PART NEGATIVE.
 2175   REF    1             00,3563  1 3565 0           TCF    ACOS=0

 2176   REF    2 LAST 113    00,3564  1 3570 1           TCF    ACOSST2

 2177   REF 331 LAST 113     00,3565  54 141 1  ACOS=0   TS     MPAC +1
 2178   REF 332 LAST 113     00,3566  54 140 0           TS     MPAC
 2179   REF    3 LAST 113    00,3567  0 0122 0           TC     ESCAPE

 2180                        00,3570  0 0006 1  ACOSST2  EXTEND                  NOW THAT ARGUMENT IS IN PROPER RANGE,
 2181   REF 333 LAST 113     00,3571  4 0141 1           DCS    MPAC             BEGIN COMPUTATION. USE HASTINGS
 2182   REF   12 LAST 113    00,3572  6 7642 0           AD     HALF             APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
 2183   REF 334 LAST 113     00,3573  52 141 1           DXCH   MPAC             IN A SCALED VERSION WHERE P(X) IS A
 2184   REF   17 LAST 112    00,3574  52 120 0           DXCH   BUF2             SEVENTH ORDER POLYNOMIAL.

 2185   REF    3 LAST 105    00,3575  0 3272 0           TC     SQRTSUB          RETURNS WITH NORMALIZED SQUARE ROOT.

 2186   REF   58 LAST 110    00,3576  10 121 1           CCS    MPTEMP           SEE IF UN-NORMALIZATION REQUIRED.
 2187   REF    1             00,3577  1 3642 0           TCF    ACOSSHR          IF SO.
 2188   REF 335 LAST 113    00,3600  52 141 1  ACOS3     DXCH    MPAC               SET UP FOR POLYNOMIAL EVALUATION.
 2189   REF  18 LAST 113    00,3601  52 120 0            DXCH    BUF2
 2190   REF 336 LAST 114    00,3602  52 141 1            DXCH    MPAC

 2191   REF   2 LAST 112    00,3603  0 7202 0            TC      POLY
 2192                       00,3604   00006 1            DEC     6
 2193                       00,3605   13240 0            2DEC    +.353553385        COEFFICIENTS ARE C 2(+I)/PISQRT(2) WHERE
C2193                       00,3606   23630 0
 2194                       00,3607   74721 0            2DEC*   -.0483017006 B+1*                 I
C2194                       00,3610   47775 1
 2195                       00,3611   02440 0            2DEC*   +.0200273085 B+2*     WHERE C STANDS FOR ORIGINAL COEFFS.
C2195                       00,3612   20237 0
 2196                       00,3613   75067 1            2DEC*   -.0112931863 B+3*
C2196                       00,3614   70742 1
 2197                       00,3615   03436 0            2DEC*   +.00695311612 B+4*
C2197                       00,3616   26756 1
 2198                       00,3617   74037 0            2DEC*   -.00384617957 B+5*
C2198                       00,3620   57640 1
 2199                       00,3621   03046 0            2DEC*   +.001501297736 B+6*
C2199                       00,3622   07143 0
 2200                       00,3623   76654 1            2DEC*   -.000284160334 B+7*
C2200                       00,3624   42244 0
 2201   REF   2 LAST 112    00,3625  3 2434 0            CAF     LBUF2              DO FINAL MULTIPLY AND GO TO ANY
 2202   REF  20 LAST 112    00,3626  0 7066 0            TC      DMPSUB -1          EPILOGUE SEQUENCES.
 2203   REF   4 LAST 113    00,3627  0 0122 0            TC      ESCAPE

 2204                       00,3630  0 0006 1  SUBTR     EXTEND                     EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
 2205   REF 337 LAST 114    00,3631  4 0141 1            DCS     MPAC
 2206   REF  13 LAST 113    00,3632  6 7642 0            AD      HALF               FORMS PI - ARCCOS(-X) = ARCCOS(X).
 2207   REF 338 LAST 114    00,3633  52 141 1            DXCH    MPAC
 2208   REF   2 LAST 113    00,3634  0 0123 1            TC      ESCAPE2            GO TO POSSIBLE ARCSIN EPILOGUE.

 2209                       00,3635  0 0006 1  ASINEX    EXTEND
 2210   REF 339 LAST 114    00,3636  4 0141 1            DCS     MPAC               ARCSIN EPILOGUE - GET ARCSIN(X)
 2211   REF   3 LAST 111    00,3637  6 7643 1            AD      QUARTER            = PI/2 - ARCCOS(X).
 2212   REF 340 LAST 114    00,3640  52 141 1            DXCH    MPAC
 2213   REF  37 LAST 112    00,3641  1 6014 0  LDANZIG   TCF     DANZIG
 2214   REF  36 LAST 113     00,3642  50 000 1  ACOSSHR  INDEX   A                  THE SHIFT RIGHT IS LESS THAN 14 SINCE
 2215   REF   7 LAST 103     00,3643  3 7642 0           CAF     BIT14              THE INPUT WAS NON-ZERO DP.
 2216   REF  59 LAST 113     00,3644  54 121 1           TS      MPTEMP
 2217   REF   4 LAST  81     00,3645  0 2054 1           TC      VSHRRND            DP SHIFT RIGHT AND ROUND.
 2218   REF   1              00,3646  1 3600 0           TCF     ACOS3              PROCEED.

 2219   REF  37 LAST 115     00,3647  10 000 0  ACOSOVF  CCS     A                  IF MAJOR PART WAS ONLY 1 MORE THAN .5,
 2220                        00,3650  1 3652 1           TCF     +2                 CALL ANSWER 0.
 2221   REF   2 LAST 113     00,3651  1 3565 0           TCF     ACOS=0
 2222   REF   3 LAST 115     00,3652  1 3565 0           TCF     ACOS=0

 2223   REF   2 LAST 108     00,3653  0 5446 1  ACOSABRT TC      ABORT
 2224                        00,3654   01301 1           OCT     1301

 2225   REF   4 LAST 114     00,3655  3 7643 1  ACOSZERO CAF     QUARTER            ACOS(0) = PI/2.
 2226   REF   4 LAST 115     00,3656  1 3566 0           TCF     ACOS=0 +1          SET MPAC AND EXIT VIA ESCAPE.

 2227                              00,3657  ENDINTSO EQUALS
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L       LIST-PROCESSING INTERPRETER                                                  USER'S OWN PAGE NO.  83

P2228             THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2230                 1.  AXT                  ADDRESS TO INDEX TRUE.
R2231                 1.  AXC                  ADDRESS TO INDEX COMPLEMENTED.
R2232                 3.  LXA                  LOAD INDEX FROM ERASABLE.
R2233                 4.  LXC                  LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2234                 5.  SXA                  STORE INDEX IN ERASABLE.
R2235                 6.  XCHX                 EXCHANGE INDEX REIGSTER WITH ERASABLE.

R2236                 7.  INCR                 INCREMENT INDEX REGISTER.
R2237                 8.  XAD                  ERASABLE ADD TO INDEX REGISTER.
R2238                 9.  XSU                  ERASABLE SUBTRACT FROM INDEX REGISTER.

R2239                10.  TIX                  BRANCH ON INDEX REGISTER AND DECREMENT.


 2240                                  01,2000                SETLOC  12000           SUFFIX CLASS 01 IS IN BANK 1.

 2241   REF   1              01,2000  0 2061 1  AXT     TC      TAGSUB           SELECT APPROPRIATE INDEX REGISTER.
 2242   REF  13 LAST  65     01,2001  3 0103 0          CA      POLISH
 2243   REF   4 LAST  38     01,2002  50 114 0  XSTORE  INDEX   INDEXLOC         CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
 2244   REF   3 LAST  47     01,2003  54 046 1          TS      X1
 2245   REF  38 LAST 114     01,2004  1 6014 0          TCF     DANZIG

 2246   REF   2 LAST 116     01,2005  0 2061 1  AXC     TC      TAGSUB
 2247   REF  14 LAST 116     01,2006  4 0103 1          CS      POLISH
 2248   REF   1              01,2007  0 2002 1          TC      XSTORE

 2249   REF   3 LAST 116     01,2010  0 2061 1  LXA     TC      TAGSUB           LOAD INDEX FROM ERASABLE.
 2250   REF  77 LAST 105     01,2011  50 102 1          INDEX   ADDRWD
 2251                        01,2012  3 0000 1          CA      0
 2252   REF   2 LAST 116     01,2013  1 2002 0          TCF     XSTORE

 2253   REF   4 LAST 116     01,2014  0 2061 1  LXC     TC      TAGSUB           LOAD INDEX FROM ERASABLE COMPLEMENTED.
 2254   REF  78 LAST 116     01,2015  50 102 1          INDEX   ADDRWD
 2255                        01,2016  4 0000 0          CS      0
 2256   REF   3 LAST 116     01,2017  1 2002 0          TCF     XSTORE

 2257   REF   5 LAST 116     01,2020  0 2061 1  SXA     TC      TAGSUB           STORE INDEX IN ERASABLE.
 2258   REF   5 LAST 116     01,2021  50 114 0          INDEX   INDEXLOC
 2259   REF   4 LAST 116     01,2022  3 0046 0          CA      X1
 2260   REF   2 LAST  83     01,2023  1 6627 0          TCF     STORE1           (STORE SINGLE PRECISION BEFORE EXIT).

 2261   REF   6 LAST 116     01,2024  0 2061 1  XCHX    TC      TAGSUB           EXCHANGE INDEX REGISTER WITH ERASABLE.
 2262   REF  79 LAST 116     01,2025  50 102 1          INDEX   ADDRWD
 2263                        01,2026  3 0000 1          CA      0
 2264   REF   6 LAST 116     01,2027  50 114 0          INDEX   INDEXLOC
 2265   REF   5 LAST 116     01,2030  56 046 0          XCH     X1
 2266   REF   3 LAST 116     01,2031  1 6627 0          TCF     STORE1
 2267   REF   7 LAST 116     01,2032  0 2061 1  XAD      TC     TAGSUB        ERASABLE ADD TO INDEX.
 2268   REF  80 LAST 116     01,2033  50 102 1           INDEX  ADDRWD
 2269                        01,2034  3 0000 1           CA     0
 2270   REF   7 LAST 116     01,2035  50 114 0  XAD2     INDEX  INDEXLOC
 2271   REF   6 LAST 116     01,2036  26 046 1           ADS    X1            IGNORING OVERFLOWS.
 2272   REF  39 LAST 116     01,2037  1 6014 0           TCF    DANZIG

 2273   REF   8 LAST 117     01,2040  0 2061 1  INCR     TC     TAGSUB        INCREMENT INDEX REGISTER.
 2274   REF  15 LAST 116     01,2041  3 0103 0           CA     POLISH
 2275   REF   1              01,2042  1 2035 1           TCF    XAD2

 2276   REF   9 LAST 117     01,2043  0 2061 1  XSU      TC     TAGSUB        ERASABLE SUBTRACT FROM INDEX.
 2277   REF  81 LAST 117     01,2044  50 102 1           INDEX  ADDRWD
 2278                        01,2045  4 0000 0           CS     0
 2279   REF   2 LAST 117     01,2046  1 2035 1           TCF    XAD2


 2280   REF  10 LAST 117     01,2047  0 2061 1  TIX      TC     TAGSUB        BRANCH AND DECREMENT ON INDEX.
 2281   REF   8 LAST 117     01,2050  50 114 0           INDEX  INDEXLOC
 2282   REF   1              01,2051  4 0050 0           CS     S1
 2283   REF   9 LAST 117     01,2052  50 114 0           INDEX  INDEXLOC
 2284   REF   7 LAST 117     01,2053  6 0046 0           AD     X1
 2285                        01,2054  0 0006 1           EXTEND               NO OPERATION IF DECREMENTED INDEX IS
 2286   REF  40 LAST 117     01,2055  6 6014 1           BZMF   DANZIG        NEGATIVE OR ZERO.

 2287   REF  10 LAST 117     01,2056  50 114 0  DOTIXBR  INDEX  INDEXLOC
 2288   REF   8 LAST 117     01,2057  56 046 0           XCH    X1            IGNORING OVERFLOWS.

 2289   REF   5 LAST 106     01,2060  1 6651 1           TCF    GOTO          DO THE BRANCH USING THE CADR IN POLISH.


R2290              SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

 2292   REF  15 LAST 106     01,2061  3 0104 1  TAGSUB   CA     FIXLOC
 2293   REF  11 LAST 117     01,2062  54 114 1           TS     INDEXLOC

 2294   REF  24 LAST  87     01,2063  10 020 1           CCS    CYR           BIT 15 SPECIFIES INDEX.
 2295   REF  12 LAST 117     01,2064  24 114 0           INCR   INDEXLOC      0 MEANS USE X2.
 2296   REF  57 LAST 109     01,2065  0 0002 0           TC     Q
 2297   REF  58 LAST 117     01,2066  0 0002 0           TC     Q             1 FOR X1.
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P2298              MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES, INCLUDED HERE ARE:

R2300              1.  ITA                STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2302              2.  CALL               CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2304              3.  RTB                RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2306              4.  BHIZ               BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2308              5.  BOV                BRANCH ON OVERFLOW.
R2309              6.  GOTO               SIMPLE SEQUENCE CHANGE.

 2310  REF  25 LAST 117    01,2067  10 020 1  RTB/BHIZ CCS     CYR
 2311  REF  16 LAST 117    01,2070  3 0103 0  RTB      CA      POLISH     TC    SWCALL -1
 2312  REF   1             01,2071  1 4105 0           ~~TCF     BANKJUMP~~             CALL BASIC ROUTINE.

 2313  REF 341 LAST 114    01,2072  10 140 0  [BHIZ]   CCS     MPAC
 2314  REF  41 LAST 117    01,2073  1 6014 0           TCF     DANZIG  ←
 2315  REF   6 LAST 117    01,2074  1 6651 1           TCF     GOTO
 2316  REF  42 LAST 118    01,2075  1 6014 0           TCF     DANZIG
 2317  REF   7 LAST 118    01,2076  1 6651 1           TCF     GOTO

 2318  REF   9 LAST 107    01,2077  10 105 1  BOV(B)   CCS     OVFIND                BRANCH ON OVERFLOW TO BASIC OR INTERP.
 2319                      01,2100  1 2102 1           TCF     +2
 2320  REF  43 LAST 118    01,2101  1 6014 0           TCF     DANZIG
 2321  REF  10 LAST 118    01,2102  54 105 1           TS      OVFIND
 2322  REF  26 LAST 118    01,2103  10 020 1           CCS     CYR
 2323  REF   1             01,2104  1 2070 0           TCF     RTB                   IF BASIC.
 2324                      01,2105   00360 1  B5TOB8   OCT     360
 2325  REF   8 LAST 118    01,2106  1 6651 1           TCF     GOTO
 2326    REF  27 LAST 118     01,2107  10 020 1  BZE/GOTO CCS    CYR              SEE WHICH OP-CODE IS DESIRED.
 2327    REF   6 LAST 113     01,2110  0 6711 0           TC     BRANCH           DO BZE.
 2328    REF  44 LAST 118     01,2111  1 6014 0           TCF    DANZIG
 2329    REF   9 LAST 118     01,2112  1 6651 1           TCF    GOTO             DO GOTO.
 2330    REF  45 LAST 119     01,2113  1 6014 0           TCF    DANZIG

 2331    REF  28 LAST 119     01,2114  10 020 1  BPL/BMN  CCS    CYR
 2332    REF   1              01,2115  1 2123 1           TCF    BPL
 2333                         01,2116   12000 1  5B10     DEC    5 B+10           SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

 2334    REF   7 LAST 119     01,2117  0 6711 0           TC     BRANCH           DO BMN.
 2335    REF  46 LAST 119     01,2120  1 6014 0           TCF    DANZIG
 2336    REF  47 LAST 119     01,2121  1 6014 0           TCF    DANZIG
 2337    REF  10 LAST 119     01,2122  1 6651 1           TCF    GOTO             ONLY IF NNZ.

 2338    REF   8 LAST 119     01,2123  0 6711 0  BPL      TC     BRANCH
 2339    REF  11 LAST 119     01,2124  1 6651 1           TCF    GOTO             IF POSITIVE OR ZERO.
 2340    REF  12 LAST 119     01,2125  1 6651 1           TCF    GOTO
 2341    REF  48 LAST 119     01,2126  1 6014 0           TCF    DANZIG

 2342    REF  29 LAST 119     01,2127  10 020 1  CALL/ITA CCS    CYR
 2343    REF   1              01,2130  1 6644 0           TCF    CALL

 2344    REF   1              01,2131  0 5464 1           TC     CCSHOLE
 2345    REF  16 LAST 117     01,2132  50 104 1           INDEX  FIXLOC           STORE QPRET.
 2346    REF   3 LAST 106     01,2133  3 0052 0           CA     QPRET
 2347    REF   4 LAST 116     01,2134  1 6627 0           TCF    STORE1
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P2348              THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2350   00         BONSET                   SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2351   01         SETGO                    SET A SWITCH AND DO A GOTO.
R2352   02         BOFSET                   SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2353   03         SET                      SET A SWITCH.

R2354   04         BONINV                   INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2355   05         INVGO                    INVERT A SWITCH AND DO A GOTO.
R2356   06         BOFINV                   INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2357   07         INVERT                   INVERT A SWITCH.

R2358   10         BONCLR                   CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2359   11         CLRGO                    CLEAR A SWITCH AND DO A GOTO.
R2360   12         BOFCLR                   CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2361   13         CLEAR                    CLEAR A SWITCH.

R2362   14         BON                      BRANCH IF A SWITCH WAS ON.
R2363   16         BOFF                     BRANCH IF A SWITCH WAS OFF.


R2364              THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2366              BITS 1-4    SWITCH BIT NUMBER (1-15).
R2367              BITS 5-8    SWITCH OPERATION NUMBER.
R2368              BITS 9-     SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2369              THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2371   ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.


 2373   REF   1             01,2135  3 7673 1  SWITCHES CAF    LOW4          LEAVE THE SWITCH BIT IN  SWBIT  .
 2374   REF  17 LAST 118    01,2136  7 0103 1           MASK   POLISH
 2375   REF  38 LAST 115    01,2137  50 000 1           INDEX  A
 2376   REF   6 LAST 105    01,2140  3 7641 0           CAF    BIT15         (NUMBER FROM LEFT TO RIGHT.)
 2377   REF   1             01,2141  54 115 0           TS     SWBIT

 2378   REF   1             01,2142  3 7651 1           CAF    BIT7          LEAVE THE SWITCH NUMBER IN SWWORD.
 2379                       01,2143  0 0006 1           EXTEND
 2380   REF  18 LAST 120    01,2144  7 0103 1           MP     POLISH
 2381   REF   1             01,2145  54 114 1           TS     SWWORD

 2382                       01,2146  0 0004 0           INHINT               DURING SWITCH CHANGE SO RUPT CAN USE TOO
 2383   REF  39 LAST 120    01,2147  50 000 1           INDEX  A             LEAVE THE SWITCH WORD ITSELF IN L.
 2384   REF   1             01,2150  3 0061 0           CA     STATE
 2385   REF  59 LAST 117    01,2151  54 002 1           TS     Q             Q WILL BE USED AS A CHANNEL.
 2386    REF   2 LAST  76     01,2152   3 7645 1           CAF      BIT11
 2387                         01,2153   0 0006 1           EXTEND                   DISPATCH SWITCH BIT OPERATION AS IN BITS
 2388    REF  19 LAST 120     01,2154   7 0103 1           MP       POLISH          7-8 OF POLISH.
 2389    REF   1              01,2155   7 2215 1           MASK     B3TOB4          GETS 4X2-BIT CODE.
 2390    REF  40 LAST 120     01,2156   50 000 1           INDEX    A
 2391                         01,2157   1 2160 0           TCF      +1

 2392    REF   2 LAST 120     01,2160   3 0115 1   +1      CA       SWBIT           00 - SET SWITCH IN QUESTION.
 2393                         01,2161   0 0006 1           EXTEND
 2394    REF  60 LAST 120     01,2162   04 002 1           ROR      Q
 2395    REF   1              01,2163   1 2172 0           TCF      SWSTORE

 2396    REF   3 LAST 121     01,2164   3 0115 1   +5      CA       SWBIT           01 - INVERT SWITCH.
 2397                         01,2165   0 0006 1           EXTEND
 2398    REF  61 LAST 121     01,2166   06 002 0           RXOR     Q
 2399    REF   2 LAST 121     01,2167   1 2172 0           TCF      SWSTORE

 2400    REF   4 LAST 121     01,2170   4 0115 0   +9D     CS       SWBIT           10 - CLEAR.
 2401    REF  62 LAST 121     01,2171   7 0002 1           MASK     Q
 2402    REF   2 LAST 120     01,2172   50 114 0 SWSTORE   INDEX    SWWORD
 2403    REF   2 LAST 120     01,2173   54 061 1           TS       STATE           NEW SWITCH WORD.
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2404                      01,2174  0 0003 1   +13D     RELINT              11 - NOOP.
2405  REF   2 LAST  76    01,2175  3 7643 1            CAF     BIT13
2406                      01,2176  0 0006 1            EXTEND              DISPATCH SEQUCE CHANGING OR BRANCHING
2407  REF  20 LAST 121    01,2177  7 0103 1            MP      POLISH      CODE.
2408  REF   2 LAST 121    01,2200  7 2215 1            MASK    B3TOB4
2409  REF  41 LAST 121    01,2201  50 000 1            INDEX   A
2410                      01,2202  1 2203 0            TCF     +1          ORIGINALLY STORED IN BITS 5-6.

2411  REF  63 LAST 121    01,2203  4 0002 1   +1       CS      Q           00 - BRANCH IF ON.
2412  REF   5 LAST 121    01,2204  7 0115 0  TEST      MASK    SWBIT
2413  REF  42 LAST 122    01,2205  10 000 0            CCS     A
2414  REF   1             01,2206  1 2216 1            TCF     SWSKIP

2415  REF   1             01,2207  1 6703 1   +5       TCF     SWBRANCH    01 - GO TO.

2416  REF   2 LAST 122    01,2210  1 2216 1            TCF     SWSKIP      HERE ONLY ON BIT 15.

2417  REF   2 LAST 119    01,2211  0 5464 1            TC      CCSHOLE
2418  REF   3 LAST 122    01,2212  0 5464 1            TC      CCSHOLE

2419  REF  64 LAST 122    01,2213  3 0002 0   +9D      CA      Q           10 - BRANCH IF OFF.
2420  REF   1             01,2214  1 2204 1            TCF     TEST

2421                      01,2215   00014 1  B3TOB4    OCT     14

2422  REF  28 LAST  56    01,2216  24 150 0  SWSKIP    INCR    LOC

2423  REF   1                       01,2135  SW/       EQUALS  SWITCHES

2424  REF  49 LAST 119    01,2217  1 6014 0   +13D     TCF     DANZIG      11 - NOOP.

2425                                01,2220  ENDINTS1  EQUALS
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L       SINGLE PRECISION SUBROUTINES                                                        USER'S OWN PAGE NO.   1

 0001   REF   1                           4232               SETLOC ENDIBNKF

R0002   SINGLE PRECISION SINE AND COSINE

 0003   REF  14 LAST 114           4232   6 7642 0  SPCOS    AD      HALF                 ARGUMENTS SCALED AT PI
 0004   REF   1                    4233  55'105 0  SPSIN    TS      TEMK
 0005   REF   1                    4234   1 4236 0           TCF     SPT
 0006   REF   2 LAST 123           4235   4 1105 0           CS      TEMK
 0007                              4236   6 0000 1  SPT      DOUBLE
 0008   REF   3 LAST 123           4237  55'105 0           TS      TEMK
 0009   REF   1                    4240   1 4251 1           TCF     POLLEY
 0010   REF   4 LAST 123           4241  57'105 1           XCH     TEMK
 0011   REF   5 LAST 123           4242  51'105 1           INDEX   TEMK
 0012   REF   1                    4243   6 7640 1           AD      LIMITS
 0013                              4244   4 0000 0           COM
 0014   REF   6 LAST 123           4245   6 1105 1           AD      TEMK
 0015   REF   7 LAST 123           4246  55'105 0           TS      TEMK
 0016   REF   2 LAST 123           4247   1 4251 1           TCF     POLLEY
 0017   REF   1                    4250   1 4267 1           TCF     ARG90
 0018                              4251   0 0006 1  POLLEY   EXTEND
 0019   REF   8 LAST 123           4252   7 1105 0           MP      TEMK
 0020   REF   1                    4253  55'106 0           TS      SQ
 0021                              4254   0 0006 1           EXTEND
 0022   REF   1                    4255   7 4274 0           MP      C5/2
 0023   REF   1                    4256   6 4273 0           AD      C3/2
 0024                              4257   0 0006 1           EXTEND
 0025   REF   2 LAST 123           4260   7 1106 0           MP      SQ
 0026   REF   1                    4261   6 4272 1           AD      C1/2
 0027                              4262   0 0006 1           EXTEND
 0028   REF   9 LAST 123           4263   7 1105 0           MP      TEMK
 0029                              4264  20 001 1            DDOUBL
 0030   REF  10 LAST 123           4265  55'105 0           TS      TEMK
 0031   REF  65 LAST 122           4266   0 0002 0           TC      Q
 0032   REF  43 LAST 122           4267  50 000 1   ARG90    INDEX   A
 0033   REF   2 LAST 123           4270   4 7640 0           CS      LIMITS
 0034   REF  66 LAST 123           4271   0 0002 0           TC      Q                    RESULT SCALED AT 1
 0035                              4272    31103 1  C1/2     DEC     .7853134
 0036                              4273    65552 0  C3/2     DEC     -.3216146
 0037                              4274    01124 1  C5/2     DEC     .0363551
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L        SINGLE PRECISION SUBROUTINES                                                          USER'S OWN PAGE NO.   2

R0038    ENTER WITH ARGUMENT IN A, EXIT WITH ROOT IN A.  IF GIVEN A NEGATIVE ARGUMENT, THE RETURN SKIPS WITH CCS RESULT.
R0040    MINUS ZERO RETURNS LIKE PLUS ZERO.
R0041    MAXIMUM ERROR IN ANSWER IS NO GREATER THAN 2 BITS.
R0042    INTERRUPT PROGRAMS USING SPROOT MUST SAVE AND RESTORE SR.


 0043    REF   1                4275  55'107 1  SPROOT    TS       SQRARG             ENTER WITH C(A) = Y
 0044    REF  44 LAST 123       4276  10 000 0            CCS      A
 0045    REF   1                4277  1 4303 1            TCF      POSARG             IF PNZ, CONTINUE
 0046    REF  67 LAST 123       4300  0 0002 0            TC       Q                  RETURN WITH 0 FOR +0
 0047    REF  68 LAST 124       4301  24 002 0            INCR     Q
 0048    REF  69 LAST 124       4302  0 0002 0            TC       Q                  RETURN WITH 0 FOR -0

 0049                           4303  0 0006 1  POSARG    EXTEND
 0050    REF   2 LAST  17       4304  23'106 1            QXCH     ROOTRET            WILL BE CALLING SPROOT1
 0051    REF   1                4305  6 4362 1            AD       63/64+1            B(A) = Y - 1
 0052                           4306  54 000 0            OVSK
 0053    REF   1                4307  1 4351 0            TCF      SPROOT2
 0054    REF   2 LAST 124       4310  57'107 0            XCH      SQRARG             ARG JUGGLING

 0055    REF   3 LAST 124       4311  55'107 1  SPROOT3   TS       SQRARG
 0056    REF  10 LAST 110       4312  54 021 0            TS       SR                 C(A) = Y
 0057    REF  11 LAST 124       4313  56 021 1            XCH      SR                 (LOSE 1 BIT)
 0058    REF   2 LAST  17       4314  55'105 0            TS       HALFY              HALFY = Y/2
 0059    REF   1                4315  6 4360 0            AD       -1/8               FORM Y/2 - 1/8
 0060    REF  45 LAST 124       4316  10 000 0            CCS      A                  TEST FOR FIRST GUESS
 0061    REF   1                4317  6 4361 1            AD       5/8+1              Y .G. 1/4, X = Y/2 + 1/2
 0062    REF   1                4320  0 4325 1            TC       HIGUESS            +0 IMPOSSIBLE FROM ADDITION
 0063                           4321  1 4322 1            NOOP                        Y .LE. 1/4, X/2 = Y + 1/16
 0064    REF   3 LAST 121       4322  3 7645 1            CAF      BIT11              1/16
 0065    REF   4 LAST 124       4323  6 1107 0            AD       SQRARG             SQRARG = Y
 0066                           4324  6 0000 1            DOUBLE                      X FROM X/2
 0067    REF   1                4325  0 4340 1  HIGUESS   TC       SPROOT1
 0068    REF   2 LAST 124       4326  0 4340 1            TC       SPROOT1            ITERATE TWICE
 0069    REF   3 LAST 124       4327  57'106 1            XCH      ROOTRET            SAVE ANSWER AND GET Q
 0070    REF  46 LAST 124       4330  10 000 0            CCS      A
 0071    REF   4 LAST 124       4331  57'106 1            XCH      ROOTRET            NO SHIFT NEEDED
 0072    REF   1                4332  0 4336 0            TC       ROOTBCK
 0073    REF   5 LAST 124       4333  57'106 1            XCH      ROOTRET            Q NEG, SHIFT RIGHT THREE
 0074                           4334  0 0006 1            EXTEND
 0075    REF   1                4335  7 7644 1            MP       BIT12              EXP -3
 0076    REF   6 LAST 124       4336  51'106 1  ROOTBCK   INDEX    ROOTRET            ROOTRET = Q - 1
 0077                           4337  0 0001 0            TC       1                  RETURN, C(A) = SQRT(Y)

 0078    REF  12 LAST 124       4340  56 021 1  SPROOT1   XCH      SR                 SR = X/2
 0079    REF   3 LAST 124       4341  4 1105 0            CS       HALFY              NEWTON ITER  X = X/2 + (Y/2 / X/2) / 2
 0080                           4342  22 007 0            ZL
 0081                           4343  0 0006 1            EXTEND
 0082    REF  13 LAST 124       4344  10 021 0            DV       SR                 C(SR) = X/2 DV DOES NOT EDIT
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L         SINGLE PRECISION SUBROUTINES                                                    USER'S OWN PAGE NO.   3

 0083    REF  14 LAST 124         4345  56 021 1              XCH     SR
 0084                             4346  0 0006 1              EXTEND
 0085    REF  15 LAST 125         4347  60 021 1              SU      SR
 0086    REF  70 LAST 124         4350  0 0002 0              TC      Q                 C(A) = X (NEXT)

 0087    REF   7 LAST 124         4351  4 1106 0  SPROOT2     CS      ROOTRET           SET RETURN Q NEG, AS FLAG
 0088    REF   8 LAST 125         4352  55 1106 0             TS      ROOTRET
 0089    REF   2 LAST 120         4353  3 7651 1              CAF     BIT7              SHIFT FOR SIGNIFCANCE
 0090                             4354  0 0006 1              EXTEND
 0091    REF   5 LAST 124         4355  7 1107 1              MP      SQRARG
 0092    REF  19 LAST 111         4356  3 0001 0              CA      L                 B(A) = 0
 0093    REF   1                  4357  0 4311 0              TC      SPROOT3

 0094                             4360   73777 1  -1/8        OCTAL   73777
 0095                             4361   24001 0  5/8+1       OCTAL   24001
 0096                             4362   37401 0  63/64+1     OCTAL   37401


 0097                                   4363  ENDSUBSF EQUALS
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L      EXECUTIVE                                                                   USER'S OWN PAGE NO.   1

 0001  REF   1                       4363         SETLOC ENDSUBSF

R0002           TO ENTER A JOB REQUEST REQUIRING NO VAC AREA:

 0003  REF   1              4363  54 070 1  NOVAC     TS      NEWPRIO         SAVE PRIORITY OF NEW JOB.
 0004                       4364  0 0006 1            EXTEND
 0005  REF  71 LAST 125     4365  5 0002 0            INDEX   Q               Q WILL BE UNDISTURBED THROUGHOUT.
 0006                       4366  3 0001 0            DCA     0               2CADR OF JOB ENTERED.
 0007  REF   1              4367  52 073 1            DXCH    NEWLOC
 0008  REF   1              4370  3 4447 1            CAF     EXECBANK
 0009  REF  28 LAST  74     4371  56 004 0            XCH     FBANK
 0010  REF   1              4372  54 065 0            TS      EXECTEM1
 0011  REF   1              4373  1 2242 0            TCF     NOVAC2          ENTER EXECUTIVE BANK.

R0012           TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

 0014  REF   2 LAST 126     4374  54 070 1  FINDVAC   TS      NEWPRIO
 0015                       4375  0 0006 1            EXTEND
 0016  REF  72 LAST 126     4376  5 0002 0            INDEX   Q
 0017                       4377  3 0001 0            DCA     0
 0018  REF   2 LAST 126     4400  52 073 1            DXCH    NEWLOC
 0019  REF   2 LAST 126     4401  3 4447 1            CAF     EXECBANK
 0020  REF  29 LAST 126     4402  56 004 0            XCH     FBANK
 0021  REF   1              4403  1 2220 1            TCF     FINDVAC2        OFF TO EXECUTIVE SWITCHED-BANK.

R0022           TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

 0024  REF   3 LAST 126     4404  3 4447 1  CHANG1    CAF     EXECBANK
 0025  REF  20 LAST 125     4405  54 001 1            TS      L
 0026  REF  73 LAST 126     4406  3 0002 0            CA      Q
 0027  REF   9 LAST  34     4407  22 006 1   +3       LXCH    BBANK
 0028                       4410  0 0004 0            INHINT
 0029  REF   1              4411  1 2320 0            TCF     CHANJOB

R0030           TO SUSPEND AN INTERPRETIVE JOB:

 0031  REF   4 LAST 126     4412  3 4447 1  CHANG2    CAF     EXECBANK
 0032  REF  21 LAST 126     4413  54 001 1            TS      L
 0033  REF  29 LAST 122     4414  4 0150 1            CS      LOC             NEGATIVE LOC SHOWS JOB INTERPRETIVE.
 0034  REF   1              4415  1 4407 1            TCF     CHANG1 +3
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P0035             TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0037   REF  30 LAST 126        4416  54 150 1  JOBSLEEP TS      LOC
 0038   REF   5 LAST 126        4417  3 4447 1           CAF     EXECBANK
 0039   REF  30 LAST 126        4420  54 004 1           TS      FBANK
 0040   REF   1                 4421  1 2403 0           TCF     JOBSLP1

R0041             TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0042   REF   3 LAST 126        4422  54 072 0  JOBWAKE  TS      NEWLOC
 0043   REF   9 LAST  71        4423  4 7656 1           CS      TWO              EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0044   REF  74 LAST 126        4424  26 002 1           ADS     Q
 0045   REF   6 LAST 127        4425  3 4447 1           CAF     EXECBANK
 0046   REF  31 LAST 127        4426  56 004 0           XCH     FBANK
 0047   REF   1                 4427  1 2414 0           TCF     JOBWAKE2

R0048             TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0049                           4430  0 0004 0  PRIOCHNG INHINT                   NEW PRIORITY ARRIVES IN A. RETURNS TO
 0050   REF   3 LAST 126        4431  54 070 1           TS      NEWPRIO          CALLER AS SOON AS NEW JOB PRIORITY IS
 0051   REF   7 LAST 127        4432  3 4447 1           CAF     EXECBANK         HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0052   REF  10 LAST 126        4433  56 006 1           XCH     BBANK            STYLE CHANGE-JOB.
 0053   REF   8 LAST  55        4434  54 151 0           TS      BANKSET
 0054   REF  75 LAST 127        4435  3 0002 0           CA      Q
 0055   REF   1                 4436  1 2463 0           TCF     PRIOCH2

R0056             TO FREE THE DISPLAY BEFORE ENDOFJOB:

 0057   REF   1                 4437  0 5401 1  EJFREE   TC      FREEDSP

R0058             TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059   REF   8 LAST 127        4440  3 4447 1  ENDOFJOB CAF     EXECBANK
 0060   REF  32 LAST 127        4441  54 004 1           TS      FBANK
 0061   REF   1                 4442  1 2474 0           TCF     ENDJOB1

 0062   REF   2 LAST 126        4443  3 0065 1  ENDFIND  CA      EXECTEM1         RETURN TO CALLER AFTER JOB ENTRY
 0063   REF  33 LAST 127        4444  54 004 1           TS      FBANK            COMPLETE.
 0064   REF  76 LAST 127        4445  50 002 0           INDEX   Q
 0065                           4446  0 0002 0           TC      2

 0066   REF   2 LAST 126        4447   02220 0  EXECBANK CADR    FINDVAC2
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L       EXECUTIVE                                                                   USER'S OWN PAGE NO.   3

P0067            LOCATE AN AVAILABLE VAC AREA.

 0068   REF   1                           01,2220            SETLOC ENDINTS1

 0069   REF   3 LAST 127       01,2220  54 065 0  FINDVAC2 TS     EXECTEM1          (SAVE CALLER'S BANK FIRST.)
 0070   REF   1                01,2221  10 431 0           CCS    VAC1USE
 0071   REF   1                01,2222  1 2235 0           TCF    VACFOUND
 0072   REF   1                01,2223  10 505 0           CCS    VAC2USE
 0073   REF   2 LAST 128       01,2224  1 2235 0           TCF    VACFOUND
 0074   REF   1                01,2225  10 561 1           CCS    VAC3USE
 0075   REF   3 LAST 128       01,2226  1 2235 0           TCF    VACFOUND
 0076   REF   1                01,2227  10 635 0           CCS    VAC4USE
 0077   REF   4 LAST 128       01,2230  1 2235 0           TCF    VACFOUND
 0078   REF   1                01,2231  10 711 1           CCS    VAC5USE
 0079   REF   5 LAST 128       01,2232  1 2235 0           TCF    VACFOUND
 0080   REF   3 LAST 115       01,2233  0 5446 1           TC     ABORT
 0081                          01,2234   01201 0           OCT    1201              NO VAC AREAS.

 0082   REF  10 LAST 127       01,2235  6 7656 0  VACFOUND AD     TWO               RESERVE THIS VAC AREA BY STORING A ZERO
 0083                          01,2236  22 007 0           ZL                       IN ITS VAC USE REGISTER AND STORE THE
 0084   REF  47 LAST 124       01,2237  50 000 1           INDEX  A                 ADDRESS OF THE FIRST WORD OF IT IN THE
 0085                          01,2240  21'777 0           LXCH   0 -1              LOW NINE BITS OF THE PRIORITY WORD.
 0086   REF   4 LAST 127       01,2241  26 070 1           ADS    NEWPRIO

 0087   REF  34 LAST 113       01,2242  3 7665 0  NOVAC2   CAF    ZERO              NOVAC ENTERS HERE. FIND A CORE SET.
 0088   REF   1                01,2243  54 071 0           TS     LOCCTR
 0089   REF   1                01,2244  3 2251 0           CAF    NO.CORES          SEVEN SETS OF ELEVEN REGISTERS EACH.
 0090   REF   1                01,2245  54 066 0  NOVAC3   TS     EXECTEM2
 0091   REF   2 LAST 128       01,2246  50 071 1           INDEX  LOCCTR
 0092   REF   1                01,2247  10 153 1           CCS    PRIORITY          EACH PRIORITY REGISTER CONTAINS -0 IF
 0093   REF   1                01,2250  1 2311 1           TCF    NEXTCORE          THE CORRESPONDING CORE SET IS AVAILABLE.
 0094                          01,2251   00006 1  NO.CORES DEC    6
 0095   REF   2 LAST 128       01,2252  1 2311 1           TCF    NEXTCORE          AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                                               BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
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L      EXECUTIVE                                                                        USER'S OWN PAGE NO.  4

0097   REF   5 LAST 128     01,2253  3 0070 0  CORFOUND CA      NEWPRIO      SET THE PRIORITY OF THIS JOB IN THE CORE
0098   REF   3 LAST 128     01,2254  50 071 1           INDEX   LOCCTR       SET'S PRIORITY REGISTER AND SET THE
0099   REF   2 LAST 128     01,2255  54 153 1           TS      PRIORITY     JOB'S PUSH-DOWN POINTER AT THE BEGINNING
0100   REF   1              01,2256  7 7672 1           MASK    LOW9         OF THE WORK AREA AND OVERFLOW INDICATOR
0101   REF   4 LAST 129     01,2257  50 071 1           INDEX   LOCCTR
0102   REF  19 LAST 106     01,2260  54 152 0           TS      PUSHLOC      OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

0103   REF   5 LAST 129     01,2261  10 071 0           CCS     LOCCTR       IF CORE SET ZERO IS BEING LOADED, SET UP
0104   REF   1              01,2262  1 2276 1           TCF     SETLOC       OVFIND AND FIXLOC IMMEDIATELY .
0105   REF  11 LAST 118     01,2263  54 105 1           TS      OVFIND
0106   REF  20 LAST 129     01,2264  3 0152 1           CA      PUSHLOC
0107   REF  17 LAST 119     01,2265  54 104 0           TS      FIXLOC

0108   REF   2 LAST  35     01,2266  10 067 1  SPECTEST CCS     NEWJOB       SEE IF ANY ACTIVE JOBS WAITING (RARE).
0109   REF   2 LAST 129     01,2267  1 2276 1           TCF     SETLOC       MUST BE AWAKENED BUT UNCHANGED JOB.
0110   REF   4 LAST 122     01,2270  0 5464 1           TC      CCSHOLE
0111   REF   5 LAST 129     01,2271  0 5464 1           TC      CCSHOLE
0112   REF   3 LAST 129     01,2272  54 067 1           TS      NEWJOB       +0 SHOWS ACTIVE JOB ALREADY SET.
0113   REF   4 LAST 127     01,2273  52 073 1           DXCH    NEWLOC
0114   REF  31 LAST 127     01,2274  52 151 0           DXCH    LOC
0115   REF   1              01,2275  1 4443 1           TCF     ENDFIND

0116   REF   5 LAST 129     01,2276  52 073 1  SETLOC   DXCH    NEWLOC       SET UP THE LOCATION REGISTERS FOR THIS
0117   REF   6 LAST 129     01,2277  50 071 1           INDEX   LOCCTR
0118   REF  32 LAST 129     01,2300  52 151 0           DXCH    LOC
0119   REF   4 LAST 129     01,2301  50 067 0           INDEX   NEWJOB       THIS INDEX INSTRUCTION INSURES THAT THE
0120   REF   3 LAST 129     01,2302  4 0153 1           CS      PRIORITY     HIGHEST ACTIVE PRIORITY WILL BE COMPARED
0121   REF   6 LAST 129     01,2303  6 0070 0           AD      NEWPRIO      WITH THE NEW PRIORITY TO SEE IF NEWJOB
0122                        01,2304  0 0006 1           EXTEND               SHOULD BE SET TO SIGNAL A SWITCH.
0123   REF   2 LAST 129     01,2305  6 4443 0           BZMF    ENDFIND
0124   REF   7 LAST 129     01,2306  3 0071 1           CA      LOCCTR       LOCCTR IS LEFT SET AT THIS CORE SET IF
0125   REF   5 LAST 129     01,2307  54 067 1           TS      NEWJOB       THE CALLER WANTS TO LOAD ANY MPAC
0126   REF   3 LAST 129     01,2310  1 4443 1           TCF     ENDFIND      REGISTERS, ETC.

0127   REF   1              01,2311  3 2424 1  NEXTCORE CAF     COREINC
0128   REF   8 LAST 129     01,2312  26 071 0           ADS     LOCCTR
0129   REF   2 LAST 128     01,2313  10 066 0           CCS     EXECTEM2
0130   REF   1              01,2314  1 2245 1           TCF     NOVAC3
0131   REF   4 LAST 128     01,2315  0 5446 1           TC      ABORT        NO CORE SETS.
0132                        01,2316   01202 0           OCT     1202
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P0133          THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

 0135  REF  33 LAST 129    01,2317  52 151 0   -1       DXCH   LOC
 0136  REF   6 LAST 129    01,2320  50 067 0  CHANJOB   INDEX  NEWJOB           LOC ARRIVES IN A AND BBANK IN L.
 0137  REF  34 LAST 130    01,2321  52 151 0            DXCH   LOC
 0138  REF  35 LAST 130    01,2322  52 151 0            DXCH   LOC

 0139  REF 342 LAST 118    01,2323  52 141 1            DXCH   MPAC             SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
 0140  REF   7 LAST 130    01,2324  50 067 0            INDEX  NEWJOB
 0141  REF 343 LAST 130    01,2325  52 141 1            DXCH   MPAC
 0142  REF 344 LAST 130    01,2326  52 141 1            DXCH   MPAC
 0143  REF 345 LAST 130    01,2327  52 143 0            DXCH   MPAC +2
 0144  REF   8 LAST 130    01,2330  50 067 0            INDEX  NEWJOB
 0145  REF 346 LAST 130    01,2331  52 143 0            DXCH   MPAC +2
 0146  REF 347 LAST 130    01,2332  52 143 0            DXCH   MPAC +2
 0147  REF 348 LAST 130    01,2333  52 145 0            DXCH   MPAC +4
 0148  REF   9 LAST 130    01,2334  50 067 0            INDEX  NEWJOB
 0149  REF 349 LAST 130    01,2335  52 145 0            DXCH   MPAC +4
 0150  REF 350 LAST 130    01,2336  52 145 0            DXCH   MPAC +4
 0151  REF 351 LAST 130    01,2337  52 147 1            DXCH   MPAC +6
 0152  REF  10 LAST 130    01,2340  50 067 0            INDEX  NEWJOB
 0153  REF 352 LAST 130    01,2341  52 147 1            DXCH   MPAC +6
 0154  REF 353 LAST 130    01,2342  52 147 1            DXCH   MPAC +6

 0155  REF  35 LAST 128    01,2343  3 7665 0            CAF    ZERO
 0156  REF  12 LAST 129    01,2344  56 105 0            XCH    OVFIND           MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
 0157                      01,2345  0 0006 1            EXTEND
 0158                      01,2346  1 2351 0            BZF    +3
 0159  REF  21 LAST 129    01,2347  4 0152 0            CS     PUSHLOC
 0160  REF  22 LAST 130    01,2350  54 152 0            TS     PUSHLOC

 0161  REF  23 LAST 130    01,2351  52 153 1            DXCH   PUSHLOC
 0162  REF  11 LAST 130    01,2352  50 067 0            INDEX  NEWJOB
 0163  REF  24 LAST 130    01,2353  52 153 1            DXCH   PUSHLOC
 0164  REF  25 LAST 130    01,2354  52 153 1            DXCH   PUSHLOC          SWAPS PUSHLOC AND PRIORITY.
 0165  REF   2 LAST 129    01,2355  3 7672 0            CAF    LOW9             SET FIXLOC TO BASE OF VAC AREA.
 0166  REF   4 LAST 129    01,2356  7 0153 1            MASK   PRIORITY
 0167  REF  18 LAST 129    01,2357  54 104 0            TS     FIXLOC

 0168  REF  26 LAST 130    01,2360  10 152 0            CCS    PUSHLOC          SET OVERFLOW INDICATOR ACCORDING TO
 0169  REF  36 LAST 130    01,2361  3 7665 0            CAF    ZERO
 0170  REF   1             01,2362  1 2367 0            TCF    ENDPRCHG -1
 0171  REF  27 LAST 130    01,2363  4 0152 0            CS     PUSHLOC
 0172  REF  28 LAST 130    01,2364  54 152 0            TS     PUSHLOC
 0173  REF  12 LAST 106    01,2365  3 7657 1            CAF    ONE
 0174  REF  13 LAST 130    01,2366  56 105 0            XCH    OVFIND
 0175  REF  12 LAST 130    01,2367  54 067 1            TS     NEWJOB

 0176                      01,2370  0 0003 1  ENDPRCHG  RELINT
 0177  REF  36 LAST 130    01,2371  52 151 0            DXCH   LOC              BASIC JOBS HAVE POSITIVE ADDRESSES, SO
```

```
L        EXECUTIVE                                                            USER'S OWN PAGE NO.   6

 0178                        01,2372  0 0006 1        EXTEND                 DISPATCH WITH A DTCB.
 0179                        01,2373  6 2375 1        BZMF     +2            IF INTERPRETIVE, SET UP EBANK, ETC.
 0180                        01,2374  52 006 0        DTCB
```

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L       EXECUTIVE                                                                 USER'S OWN PAGE NO.   7

 0181                     01,2375  4 0000 0           COM                  EPILOGUE TO JOB CHANGE FOR INTERPRETIVE
 0182   REF  13 LAST 130  01,2376  6 7657 1           AD       ONE
 0183   REF  37 LAST 130  01,2377  54 150 1           TS       LOC         RESUME.
 0184   REF   1           01,2400  3 6232 1           CAF      FBANKMSK
 0185   REF  22 LAST 126  01,2401  7 0001 1           MASK     L
 0186   REF   1           01,2402  1 6011 0           TCF      INTRSM

R0187          COMPLETE JOBSLEEP PREPARATIONS.

 0188                     01,2403  0 0004 0  JOBSLP1  INHINT
 0189   REF   5 LAST 130  01,2404  4 0153 1           CS       PRIORITY    NNZ PRIORITY SHOWS JOB ASLEEP.
 0190   REF   6 LAST 132  01,2405  54 153 1           TS       PRIORITY
 0191   REF   3 LAST  73  01,2406  3 6027 1           CAF      LOW7
 0192   REF  11 LAST 127  01,2407  7 0006 0           MASK     BBANK
 0193   REF   9 LAST 127  01,2410  54 151 0           TS       BANKSET
 0194   REF  37 LAST 130  01,2411  4 7665 1           CS       ZERO
 0195   REF  70 LAST 109  01,2412  54 115 0  JOBSLP2  TS       BUF +1      HOLDS - HIGHEST PRIORITY.
 0196   REF   1           01,2413  1 2504 0           TCF      EJSCAN      SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.
```

```
P0197           TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0199     LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0201     LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

 0202     REF   4 LAST 128       01,2414  54 065 0  JOBWAKE2 TS       EXECTEM1
 0203     REF  38 LAST 132       01,2415  3 7665 0           CAF      ZERO             BEGIN CORE SET SCAN.
 0204     REF   9 LAST 129       01,2416  54 071 0           TS       LOCCTR
 0205     REF   2 LAST 128       01,2417  3 2251 0           CAF      NO.CORES
 0206     REF   3 LAST 129       01,2420  54 066 0  JOBWAKE4 TS       EXECTEM2
 0207     REF  10 LAST 133       01,2421  50 071 1           INDEX    LOCCTR
 0208     REF   7 LAST 132       01,2422  10 153 1           CCS      PRIORITY
 0209     REF   1                01,2423  1 2426 1           TCF      JOBWAKE3         ACTIVE JOB - CHECK NEXT CORE SET.
 0210                            01,2424    00014 1  COREINC  DEC      12               12 REGISTERS PER CORE SET.
 0211     REF   1                01,2425  1 2435 0           TCF      WAKETEST         SLEEPING JOB - SEE IF CADR MATCHES.

 0212     REF   2 LAST 129       01,2426  3 2424 1  JOBWAKE3 CAF      COREINC
 0213     REF  11 LAST 133       01,2427  26 071 0           ADS      LOCCTR
 0214     REF   4 LAST 133       01,2430  10 066 0           CCS      EXECTEM2
 0215     REF   1                01,2431  1 2420 1           TCF      JOBWAKE4
 0216     REF  14 LAST 132       01,2432  4 7657 0           CS       ONE              EXIT IF SLEEPING JOB NOT FOUND.
 0217     REF  12 LAST 133       01,2433  54 071 0           TS       LOCCTR
 0218     REF   4 LAST 129       01,2434  1 4443 1           TCF      ENDFIND

 0219     REF   6 LAST 129       01,2435  4 0072 0  WAKETEST CS       NEWLOC
 0220     REF  13 LAST 133       01,2436  50 071 1           INDEX    LOCCTR
 0221     REF  38 LAST 132       01,2437  6 0150 0           AD       LOC
 0222                            01,2440  0 0006 1           EXTEND
 0223                            01,2441  1 2443 1           BZF      +2               IF MATCH.
 0224     REF   2 LAST 133       01,2442  1 2426 1           TCF      JOBWAKE3         EXAMINE NEXT CORE SET IF NO MATCH.

 0225     REF  14 LAST 133       01,2443  50 071 1           INDEX    LOCCTR           RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
 0226     REF   8 LAST 133       01,2444  4 0153 1           CS       PRIORITY
 0227     REF   7 LAST 129       01,2445  54 070 1           TS       NEWPRIO
 0228     REF  15 LAST 133       01,2446  50 071 1           INDEX    LOCCTR
 0229     REF   9 LAST 133       01,2447  54 153 1           TS       PRIORITY

 0230     REF   2 LAST 132       01,2450  4 6232 0           CS       FBANKMSK         MAKE UP THE 2CADR OF THE WAKE ADDRESS
 0231     REF   7 LAST 133       01,2451  7 0072 0           MASK     NEWLOC           USING THE CADR IN NEWLOC AND THE EBANK
 0232     REF   4 LAST  54       01,2452  6 7645 1           AD       2K               HALF OF BBANK SAVED IN BANKSET.
 0233     REF   8 LAST 133       01,2453  56 072 1           XCH      NEWLOC
 0234     REF   3 LAST 133       01,2454  7 6232 0           MASK     FBANKMSK
 0235     REF  16 LAST 133       01,2455  50 071 1           INDEX    LOCCTR
 0236     REF  10 LAST 132       01,2456  6 0151 1           AD       BANKSET
 0237     REF   9 LAST 133       01,2457  54 073 1           TS       NEWLOC +1

 0238     REF  17 LAST 133       01,2460  10 071 0           CCS      LOCCTR           SPECIAL TREATMENT IF THIS JOB WAS
 0239     REF   3 LAST 129       01,2461  1 2276 1           TCF      SETLOC           ALREADY IN THE RUN (0) POSITION.
 0240     REF   1                01,2462  1 2266 0           TCF      SPECTEST
```

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L        EXECUTIVE                                                                  USER'S OWN PAGE NO.   9

P0241              PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

 0243    REF  39 LAST 133      01,2463   54 150 1  PRIOCH2  TS      LOC
 0244    REF  39 LAST 133      01,2464   3 7665 0           CAF     ZERO          SET FLAG TO TELL ENDJOB SCANNER IF THIS
 0245    REF  71 LAST 132      01,2465   54 114 1           TS      BUF           JOB IS STILL HIGHEST PRIORITY.
 0246    REF   3 LAST 130      01,2466   3 7672 0           CAF     LOW9
 0247    REF  10 LAST 133      01,2467   7 0153 1           MASK    PRIORITY
 0248    REF   8 LAST 133      01,2470   6 0070 0           AD      NEWPRIO
 0249    REF  11 LAST 134      01,2471   54 153 1           TS      PRIORITY
 0250                          01,2472   4 0000 0           COM
 0251    REF   1               01,2473   1 2412 0           TCF     JOBSLP2       AND TO EJSCAN.
```

```
P0252          RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

 0254                           01,2474  0 0004 0  ENDJOB1  INHINT
 0255    REF  40 LAST 134       01,2475  4 7665 1           CS       ZERO
 0256    REF  72 LAST 134       01,2476  54 115 0           TS       BUF +1
 0257    REF  12 LAST 134       01,2477  56 153 0           XCH      PRIORITY
 0258    REF   4 LAST 134       01,2500  7 7672 1           MASK     LOW9
 0259    REF  48 LAST 128       01,2501  10 000 0           CCS      A
 0260    REF  49 LAST 135       01,2502  50 000 1           INDEX    A
 0261                           01,2503  54 000 0           TS       0

 0262    REF  13 LAST 135       01,2504  10 167 0  EJSCAN   CCS      PRIORITY +12D
 0263    REF   1                01,2505  0 2551 1           TC       EJ1
 0264    REF   6 LAST 129       01,2506  0 5464 1           TC       CCSHOLE
 0265                           01,2507  1 2510 0           TCF      +1

 0266    REF  14 LAST 135       01,2510  10 203 1           CCS      PRIORITY +24D    EXAMINE EACH PRIORITY REGISTER TO FIND
 0267    REF   2 LAST 135       01,2511  0 2551 1           TC       EJ1              THE JOB OF HIGHEST ACTIVE PRIORITY.
 0268    REF   7 LAST 135       01,2512  0 5464 1           TC       CCSHOLE
 0269                           01,2513  1 2514 1           TCF      +1

 0270    REF  15 LAST 135       01,2514  10 217 1           CCS      PRIORITY +36D
 0271    REF   3 LAST 135       01,2515  0 2551 1           TC       EJ1
 0272    REF  16 LAST 135       01,2516  67 624 0  -CCSPR  -CCS      PRIORITY
 0273                           01,2517  1 2520 0           TCF      +1

 0274    REF  17 LAST 135       01,2520  10 233 1           CCS      PRIORITY +48D
 0275    REF   4 LAST 135       01,2521  0 2551 1           TC       EJ1
 0276    REF   8 LAST 135       01,2522  0 5464 1           TC       CCSHOLE
 0277                           01,2523  1 2524 1           TCF      +1

 0278    REF  18 LAST 135       01,2524  10 247 1           CCS      PRIORITY +60D
 0279    REF   5 LAST 135       01,2525  0 2551 1           TC       EJ1
 0280    REF   9 LAST 135       01,2526  0 5464 1           TC       CCSHOLE
 0281                           01,2527  1 2530 1           TCF      +1

 0282    REF  19 LAST 135       01,2530  10 263 1           CCS      PRIORITY +72D
 0283    REF   6 LAST 135       01,2531  0 2551 1           TC       EJ1
 0284    REF  10 LAST 135       01,2532  0 5464 1           TC       CCSHOLE
 0285                           01,2533  1 2534 0           TCF      +1
```

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P0286            EVALUATE THE RESULTS OF THE SCAN.

0287  REF  73 LAST 135    01,2534  10 115 0        CCS     BUF +1          SEE IF THERE ARE ANY ACTIVE JOBS WAITING
0288  REF  11 LAST 135    01,2535  0 5464 1        TC      CCSHOLE
0289  REF  12 LAST 136    01,2536  0 5464 1        TC      CCSHOLE

0290                      01,2537  1 2541 1        TCF     +2
0291  REF   1             01,2540  1 4450 0        TCF     DUMMYJOB
0292  REF  74 LAST 136    01,2541  10 114 1        CCS     BUF             BUF IS ZERO IF THIS IS A PRIOCHNG AND
0293                      01,2542  1 2544 1        TCF     +2              CHANGED PRIORITY IS STILL HIGHEST.
0294  REF   2 LAST 130    01,2543  1 2370 0        TCF     ENDPRCHG

0295  REF  50 LAST 135    01,2544  50 000 1        INDEX   A               OTHERWISE, SET NEWJOB TO THE RELATIVE
0296                      01,2545  2'7777 0        CAF     0 -1            ADDRESS OF THE NEW JOB'S CORE SET.
0297  REF   1             01,2546  6 2516 1        AD      -CCSPR
0298  REF  13 LAST 130    01,2547  54 067 1        TS      NEWJOB
0299  REF   2 LAST 126    01,2550  1 2317 1        TCF     CHANJOB -1

0300  REF  75 LAST 136    01,2551  54 116 0  EJ1   TS      BUF +2
0301  REF  76 LAST 136    01,2552  6 0115 1        AD      BUF +1          - OLD HIGH PRIORITY.
0302  REF  51 LAST 136    01,2553  10 000 0        CCS     A
0303  REF  77 LAST 136    01,2554  4 0116 0        CS      BUF +2
0304  REF   1             01,2555  1 2561 0        TCF     EJ2             NEW HIGH PRIORITY.
0305                      01,2556  1 2557 0        NOOP
0306  REF  77 LAST 127    01,2557  50 002 0        INDEX   Q
0307                      01,2560  0 0002 0        TC      2               PROCEED WITH SEARCH.

0308  REF  78 LAST 136    01,2561  54 115 0  EJ2   TS      BUF +1
0309                      01,2562  0 0006 1        EXTEND
0310  REF  79 LAST 136    01,2563  22 114 0        QXCH    BUF             FOR LOCATING CCS PRIORITY + X INSTR.
0311  REF  80 LAST 136    01,2564  50 114 0        INDEX   BUF
0312                      01,2565  0 0002 0        TC      2

0313                              01,2566  ENDEXECS EQUALS
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L     EXECUTIVE                                                                      USER'S OWN PAGE NO.  12

P0314           IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,
R0316     BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

 0317     REF   9 LAST 127                 4450             SETLOC EXECBANK +1

 0318     REF   1                            E2             EBANK= SELFRET          SELF-CHECK STORAGE IN EBANK.

 0319     REF  41 LAST 135          4450   4 7665 1  DUMMYJOB CS     ZERO           SET NEWJOB TO -0 FOR IDLING.
 0320     REF  14 LAST 136          4451  54 067 1            TS     NEWJOB
 0321                               4452   0 0003 1           RELINT
 0322     REF  11 LAST 128          4453   4 7656 1           CS     TWO            TURN OFF THE ACTIVITY LIGHT.
 0323                               4454   0 0006 1           EXTEND
 0324     REF   1                   4455  03 011 1            WAND   DSALMOUT
 0325     REF   1                   4456   1 4461 1           TCF    CHECKNJ +2

 0326                               4457   0 0006 1  CHECKNJ  EXTEND                SPECIAL NEWJOB TEST FOR SELF-CHECK,
 0327     REF   2 LAST 137          4460  23'360 0            QXCH   SELFRET        WHICH RUNS UNDER EXECUTIVE CONTROL,
 0328     REF  15 LAST 137          4461  10 067 1     +2     CCS    NEWJOB         BUT DOES NOT HAVE A JOBS CORE REGISTERS.
 0329     REF   1                   4462   1 4474 0           TCF    NUCHANGE       NEW JOB REQUIRING A CHANGE JOB.
 0330     REF  12 LAST 137          4463   3 7656 0           CAF    TWO            NEW JOB ALREADY IN POSITION FOR
 0331     REF   1                   4464   1 4470 1           TCF    NUDIRECT       EXECUTION.

 0332     REF   1                   4465   3 4503 0  ADVAN    CAF    SELFBANK       (SIMULATOR ADVAN IF NEWJOB = 77777).
 0333     REF  12 LAST 132          4466  54 006 0            TS     BBANK
 0334     REF   3 LAST 137          4467   0 1360 0           TC     SELFRET

 0335                               4470   0 0006 1  NUDIRECT EXTEND                TURN THE GREEN LIGHT BACK ON.
 0336     REF   2 LAST 137          4471  05 011 1            WOR    DSALMOUT
 0337     REF  40 LAST 134          4472  52 151 0            DXCH   LOC            JOBS STARTED IN THIS FASHION MUST BE
 0338                               4473  52 006 0            DTCB                  BASIC.

 0339     REF  13 LAST 137          4474   3 7656 0  NUCHANGE CAF    TWO
 0340                               4475   0 0006 1           EXTEND
 0341     REF   3 LAST 137          4476  05 011 1            WOR    DSALMOUT
 0342     REF  10 LAST 137          4477   3 4447 1           CAF    EXECBANK       SWAP CORE SETS.
 0343     REF  34 LAST 127          4500  54 004 1            TS     FBANK
 0344                               4501   0 0004 0           INHINT                CHANGE JOBS
 0345     REF   3 LAST 136          4502   1 2317 1           TCF    CHANJOB -1

 0346     REF   1                   4503    40002 1  SELFBANK BBCON  SELFCHK
```

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P0347             PRIORITY CONSTANTS (NOTE IN FIXED-FIXED).

 0348   REF   4 LAST  86                   7646  PRIO1      EQUALS BIT10
 0349   REF   4 LAST 124                   7645  PRIO2      EQUALS BIT11
 0350                          4504   03000 1   PRIO3      OCT    03000
 0351   REF   2 LAST 124                   7644  PRIO4      EQUALS BIT12
 0352                          4505   05000 1   PRIO5      OCT    05000
 0353                          4506   06000 1   PRIO6      OCT    06000
 0354                          4507   07000 0   PRIO7      OCT    07000
 0355   REF   3 LAST 122                   7643  PRIO10     EQUALS BIT13
 0356                          4510   11000 1   PRIO11     OCT    11000
 0357                          4511   12000 1   PRIO12     OCT    12000
 0358                          4512   13000 0   PRIO13     OCT    13000
 0359                          4513   14000 1   PRIO14     OCT    14000
 0360                          4514   15000 0   PRIO15     OCT    15000
 0361                          4515   16000 0   PRIO16     OCT    16000
 0362                          4516   17000 1   PRIO17     OCT    17000
 0363   REF   8 LAST 115                   7642  PRIO20     EQUALS BIT14
 0364                          4517   21000 1   PRIO21     OCT    21000
 0365                          4520   22000 1   PRIO22     OCT    22000
 0366                          4521   23000 0   PRIO23     OCT    23000
 0367                          4522   24000 1   PRIO24     OCT    24000
 0368                          4523   25000 0   PRIO25     OCT    25000
 0369                          4524   26000 0   PRIO26     OCT    26000
 0370                          4525   27000 1   PRIO27     OCT    27000
 0371                          4526   30000 1   PRIO30     OCT    30000
 0372                          4527   31000 0   PRIO31     OCT    31000
 0373                          4530   32000 0   PRIO32     OCT    32000
 0374                          4531   33000 1   PRIO33     OCT    33000
 0375                          4532   34000 0   PRIO34     OCT    34000
 0376                          4533   35000 1   PRIO35     OCT    35000
 0377                          4534   36000 1   PRIO36     OCT    36000
 0378                          4535   37000 0   PRIO37     OCT    37000
 0379                                  4536  ENDEXECF   EQUALS
```

```
L         WAITLIST                                                                           USER'S OWN PAGE NO.   1

R0001     GROUNDRULE....DELTA T SHOULD NOT EXCEED 12000 (= 2 MINUTES)

 0002     REF   1                          4536                SETLOC ENDEXECF

 0003     REF   3 LAST  28                   E3                EBANK= LST1               TASK  LISTS IN SWITCHED E BANK.

 0004     REF  78 LAST 136          4536   56 002 0  WAITLIST XCH      Q                  SAVE DELTA T IN Q AND RETURN IN
 0005     REF   1                   4537   54 065 0           TS       WAITEXIT          WAITEXIT.
 0006                               4540   0 0006 1           EXTEND
 0007     REF  52 LAST 136          4541   5 0000 1           INDEX    A
 0008                               4542   3 0001 0           DCA      0                 PICK UP 2CADR OF TASK.
 0009     REF   1                   4543   54 070 1           TS       WAITADR           BBCON WILL REMAIN IN L.
 0010     REF   1                   4544   3 4553 0  DLY2     CAF      WAITBB            ENTRY FROM FIXDELAY AND VARDELAY.
 0011     REF  13 LAST 137          4545   56 006 1           XCH      BBANK
 0012     REF   1                   4546   1 2566 1           TCF      WAIT2

R0013               RETURN TO CALLER AFTER TASK INSERTION:

 0014     REF   1                   4547   3 0066 1  LVWTLIST CA       WAITBANK
 0015     REF  14 LAST 139          4550   54 006 0           TS       BBANK
 0016     REF   2 LAST 139          4551   50 065 1           INDEX    WAITEXIT
 0017                               4552   0 0002 0           TC       2

 0018     REF   2 LAST 139          4553     02003 0  WAITBB   BBCON    WAIT2

R0019               RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1.

 0020     REF  79 LAST 139          4554   50 002 0  FIXDELAY INDEX    Q                 BOTH ROUTINES MUST BE CALLED UNDER
 0021                               4555   3 0000 1           CAF      0                 WAITLIST CONTROL AND TERMINATE THE TASK
 0022     REF  80 LAST 139          4556   24 002 0           INCR     Q                 IN WHICH THEY WERE CALLED.

R0023               RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.

 0024     REF  81 LAST 139          4557   56 002 0  VARDELAY XCH      Q                 DT TO Q. TASK ADRES TO WAITADR.
 0025     REF   2 LAST 139          4560   54 070 1           TS       WAITADR
 0026     REF  15 LAST 139          4561   3 0006 1           CA       BBANK             BBANK IS SAVED DURING DELAY.
 0027     REF  23 LAST 132          4562   54 001 1           TS       L
 0028     REF   1                   4563   3 4566 0           CAF      DELAYEX
 0029     REF   3 LAST 139          4564   54 065 0           TS       WAITEXIT          GO TO TASKOVER AFTER TASK ENTRY.
 0030     REF   1                   4565   1 4544 1           TCF      DLY2

 0031     REF   1                   4566   1 4600 1  DELAYEX  TCF      TASKOVER -2       RETURNS TO TASKOVER
```

```
L       WAITLIST                                                                     USER'S OWN PAGE NO.   2

R0032   ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

 0034                           4567   73206 1  ENDTASK -2CADR  SVCT3
C0034   REF    1                4570   73774 1
 0035   REF    3 LAST 121       4571  10 063 0  SVCT3    CCS    STATE +2        DRIFT FLAG
 00351  REF    2 LAST 139       4572  1 4602 0           TCF    TASKOVER
 00352  REF    3 LAST 140       4573  1 4602 0           TCF    TASKOVER
 00353                          4574  1 4575 0           TCF    +1

 00354  REF    1                4575  3 4533 0           CAF    PRIO35          COMPENSATE FOR NBD COEFFICIENTS ONLY
 00355  REF    1                4576  0 4363 0           TC     NOVAC               ENABLE EVERY 81.93 SECONDS
 00356                          4577   02257 0           2CADR  NBDONLY         EBANK IS SET TO 3
C00356  REF    1                4600   16003 0
 00357  REF    4 LAST 140       4601  1 4602 0           TCF    TASKOVER
```

```
P0036            BEGIN TASK INSERTION.

 0037   REF   1                      01,2566             SETLOC ENDEXECS

 0038   REF   2 LAST 139      01,2566  54 066 0  WAIT2    TS      WAITBANK         BBANK OF CALLING PROGRAM.
 0039   REF   1               01,2567  4 0026 1           CS      TIME3
 0040                         01,2570  6 2571 0           AD      +1               CCS  A  = + 1/4
 0041   REF  53 LAST 139      01,2571  10 000 0           CCS     A                TEST  1/4 - C(TIME3).  IF POSITIVE,
A0042                                            IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0043                                            C(TIME3) = T - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0044                                            ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0045   REF   2 LAST  77      01,2572  6 6042 1           AD      OCT40001         OVERFLOW HAS OCCURRED.  SET C(A) =
 0046   REF  54 LAST 141      01,2573  4 0000 0           CS      A                T - T1 + 3/4 - 1

R0047   NORMAL CASE (C(A) MINUS) YIELDS SAME C(A)  -(-(1.0-(T1-T))+1/4)-1

 0048   REF   1               01,2574  6 2722 1           AD      OCT50001
 0049   REF  82 LAST 139      01,2575  6 0002 0           AD      Q                RESULT = TD - T1 + 1.

 0050   REF  55 LAST 141      01,2576  10 000 0           CCS     A                TEST TD - T1 + 1

 0051   REF   4 LAST 139      01,2577  6 1400 1           AD      LST1             IF TD - T1 POS, GO TO WTLST5 WITH
 0052   REF   1               01,2600  1 2642 1           TCF     WTLST5           C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0053                         01,2601  1 2602 0           NOOP
 0054   REF  83 LAST 141      01,2602  4 0002 1           CS      Q

R0055   NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0056   SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0057   SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0058   CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0059   REF   1               01,2603  6 7642 0           AD      POS1/2           WHEN TD IS NEXT, FORM QUANTITY
 0060   REF   2 LAST 141      01,2604  6 7642 0           AD      POS1/2             1.0 - DELTA T = 1.0 - (TD - T)
 0061   REF   2 LAST 141      01,2605  56 026 0           XCH     TIME3
 0062   REF   1               01,2606  6 7641 0           AD      NEGMAX
 0063   REF  84 LAST 141      01,2607  6 0002 0           AD      Q                1.0 - DELTAT T NOW COMPLETE.
 0064                         01,2610  0 0006 1           EXTEND                   ZERO INDEX Q.
 0065                         01,2611  22 007 0           QXCH    7                (ZQ)
 0066  REF   5 LAST 141    01,2612  57'400 1  WTLST4   XCH     LST1
 0067  REF   6 LAST 142    01,2613  57'401 0           XCH     LST1 +1
 0068  REF   7 LAST 142    01,2614  57'402 0           XCH     LST1 +2
 0069  REF   8 LAST 142    01,2615  57'403 1           XCH     LST1 +3
 0070  REF   9 LAST 142    01,2616  57'404 0           XCH     LST1 +4
 0071  REF  10 LAST 142    01,2617  57'405 1           XCH     LST1 +5
 0072  REF  11 LAST 142    01,2620  57'406 1           XCH     LST1 +6
 0073  REF  12 LAST 142    01,2621  57'407 0           XCH     LST1 +7

 0074  REF   3 LAST 139    01,2622  3 0070 0           CA      WAITADR         (MINOR PART OF TASK CADR HAS BEEN IN L.)
 0075  REF  85 LAST 141    01,2623  50 002 0           INDEX   Q
 0076                      01,2624  1 2625 0           TCF     +1

 0077  REF   1             01,2625  53'411 0           DXCH    LST2
 0078  REF   2 LAST 142    01,2626  53'413 1           DXCH    LST2 +2
 0079  REF   3 LAST 142    01,2627  53'415 1           DXCH    LST2 +4
 0080  REF   4 LAST 142    01,2630  53'417 0           DXCH    LST2 +6
 0081  REF   5 LAST 142    01,2631  53'421 0           DXCH    LST2 +8D
 0082  REF   6 LAST 142    01,2632  53'423 1           DXCH    LST2 +10D       AT END, CHECK THAT C(LST2+10) IS STD
 0083  REF   7 LAST 142    01,2633  53'425 1           DXCH    LST2 +12D
 0084  REF   8 LAST 142    01,2634  53'427 0           DXCH    LST2 +14D
 0085  REF   9 LAST 142    01,2635  53'431 1           DXCH    LST2 +16D
 0086  REF   1             01,2636  6 4567 1           AD      ENDTASK           END ITEM, AS CHECK FOR EXCEEDING
A0087                                                                            THE LENGTH OF THE LIST.
 0088                      01,2637  0 0006 1           EXTEND                  DUMMY TASK ADRES SHOULD BE IN FIXED-
 0089  REF   1             01,2640  1 4547 1           BZF     LVWTLIST        FIXED SO ITS ADRES ALONE DISTINGUISHES
 0090  REF   1             01,2641  1 2715 1           TCF     WTABORT         IT.
 0091  REF  56 LAST 141    01,2642  10 000 0  WTLST5   CCS    A              TEST  TD - T2 + 1
 0092  REF  13 LAST 142    01,2643  6 1401 0           AD     LST1 +1
 0093                      01,2644  1 2650 1           TCF    +4
 0094  REF  15 LAST 133    01,2645  6 7657 1           AD     ONE
 0095  REF   1             01,2646  0 2723 0           TC     WTLST2
 0096                      01,2647    00001 0          OCT    1

 0097  REF  57 LAST 143    01,2650  10 000 0  +4       CCS    A              TEST  TD - T3 + 1
 0098  REF  14 LAST 143    01,2651  6 1402 0           AD     LST1 +2
 0099                      01,2652  1 2656 1           TCF    +4
 0100  REF  16 LAST 143    01,2653  6 7657 1           AD     ONE
 0101  REF   2 LAST 143    01,2654  0 2723 0           TC     WTLST2
 0102                      01,2655    00002 0          OCT    2

 0103  REF  58 LAST 143    01,2656  10 000 0  +4       CCS    A              TEST  TD - T4 + 1
 0104  REF  15 LAST 143    01,2657  6 1403 1           AD     LST1 +3
 0105                      01,2660  1 2664 0           TCF    +4
 0106  REF  17 LAST 143    01,2661  6 7657 1           AD     ONE
 0107  REF   3 LAST 143    01,2662  0 2723 0           TC     WTLST2
 0108                      01,2663    00003 1          OCT    3

 0109  REF  59 LAST 143    01,2664  10 000 0  +4       CCS    A              TEST  TD - T5 + 1
 0110  REF  16 LAST 143    01,2665  6 1404 0           AD     LST1 +4
 0111                      01,2666  1 2672 1           TCF    +4
 0112  REF  18 LAST 143    01,2667  6 7657 1           AD     ONE
 0113  REF   4 LAST 143    01,2670  0 2723 0           TC     WTLST2
 0114                      01,2671    00004 0          OCT    4

 0115  REF  60 LAST 143    01,2672  10 000 0  +4       CCS    A              TEST  TD - T6 + 1
 0116  REF  17 LAST 143    01,2673  6 1405 1           AD     LST1 +5
 0117                      01,2674  1 2700 0           TCF    +4
 0118  REF  19 LAST 143    01,2675  6 7657 1           AD     ONE
 0119  REF   5 LAST 143    01,2676  0 2723 0           TC     WTLST2
 0120                      01,2677    00005 1          OCT    5

 0121  REF  61 LAST 143    01,2700  10 000 0   +4      CCS    A              TEST TD - T7 + 1
 0122  REF  18 LAST 143    01,2701  6 1406 1           AD     LST1 +6
 0123                      01,2702  1 2706 0           TCF    +4
 0124  REF  20 LAST 143    01,2703  6 7657 1           AD     ONE
 0125  REF   6 LAST 143    01,2704  0 2723 0           TC     WTLST2
 0126                      01,2705    00006 1          OCT    6
 0127   REF  62 LAST 143   01,2706  10 000 0   +4       CCS     A
 0128   REF  19 LAST 143   01,2707  6 1407 0            AD      LST1 +7
 0129                      01,2710  1 2714 0            TCF     +4
 0130   REF  21 LAST 143   01,2711  6 7657 1            AD      ONE
 0131   REF   7 LAST 143   01,2712  0 2723 0            TC      WTLST2
 0132                      01,2713   00007 0            OCT     7

 0133   REF  63 LAST 144   01,2714  10 000 0   +4       CCS     A
 0134   REF   5 LAST 129   01,2715  0 5446 1  WTABORT   TC      ABORT            NO ROOM IN THE INN.
 0135                      01,2716   01203 1            OCT     1203

 0136   REF  22 LAST 144   01,2717  6 7657 1            AD      ONE
 0137   REF   8 LAST 144   01,2720  0 2723 0            TC      WTLST2
 0138                      01,2721   00010 0            OCT     10

 0139                      01,2722   50001 0  OCT50001  OCT     50001
```

```
P0140    THE ENTRY TO WTLST2 JUST PRECEDING OCT  N  IS FOR T  LE TD LE T    -1.
R0141                                                    N           N+1

R0142    (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TD - T    + 1)
R0143                                                            N+1

R0144    THE LST1 ENTRY -(T    - T +1) IS TO BE REPLACED BY -(TD - T + 1), AND
R0145                      N+1   N                                N

R0146    THE ENTRY -(T    - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
R0147                 N+1

 0148    REF   1               01,2723  54 071 0  WTLST2   TS      WAITTEMP           C(A) = -(TD - T    + 1)
 0149    REF  86 LAST 142      01,2724  50 002 0           INDEX   Q
 0150                          01,2725  3 0000 1           CAF     0
 0151    REF  87 LAST 145      01,2726  54 002 1           TS      Q                INDEX VALUE INTO Q.

 0152    REF  23 LAST 144      01,2727  3 7657 1           CAF     ONE
 0153    REF   2 LAST 145      01,2730  6 0071 1           AD      WAITTEMP
 0154    REF  88 LAST 145      01,2731  50 002 0           INDEX   Q                C(A) = -(TD - T ) + 1.
 0155    REF  20 LAST 144      01,2732  27'377 1           ADS     LST1 -1                        N

 0156    REF   3 LAST 145      01,2733  4 0071 0           CS      WAITTEMP
 0157    REF  89 LAST 145      01,2734  50 002 0           INDEX   Q
 0158    REF   1               01,2735  1 2612 1           TCF     WTLST4

R0159    C(TIME3) = 1.0 - (T1 - T)

R0160    C(LST1  ) = - (T2 - T1) + 1
R0161    C(LST1+1) = - (T3 - T2) + 1
R0162    C(LST1+2) = - (T4 - T3) + 1
R0163    C(LST1+3) = - (T5 - T4) + 1
R0164    C(LST1+4) = - (T6 - T5) + 1

R0165    C(LST2   ) = 2CADR  TASK1
R0166    C(LST2+2 ) = 2CADR  TASK2
R0167    C(LST2+4 ) = 2CADR  TASK3
R0168    C(LST2+6 ) = 2CADR  TASK4
R0169    C(LST2+8 ) = 2CADR  TASK5
R0170    C(LST2+10) = 2CADR  TASK6
```

```
P0171             ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

 0172  REF   1              01,2736  54 016 1  T3RUPT   TS      BANKRUPT
 0173                       01,2737  0 0006 1           EXTEND
 0174  REF   2 LAST  27     01,2740  22 012 1           QXCH    QRUPT

 0175  REF   2 LAST 111     01,2741  3 7640 1  T3RUPT2  CAF     NEG1/2             DISPATCH WAITLIST TASK.
 0176  REF  21 LAST 145     01,2742  57'407 0           XCH     LST1 +7
 0177  REF  22 LAST 146     01,2743  57'406 1           XCH     LST1 +6
 0178  REF  23 LAST 146     01,2744  57'405 1           XCH     LST1 +5
 0179  REF  24 LAST 146     01,2745  57'404 0           XCH     LST1 +4            1.  MOVE UP LST1 CONTENTS, ENTERING
 0180  REF  25 LAST 146     01,2746  57'403 1           XCH     LST1 +3                A VALUE OF 1/2 +1 AT THE BOTTOM
 0181  REF  26 LAST 146     01,2747  57'402 0           XCH     LST1 +2                FOR T6-T5, CORRESPONDING TO THE
 0182  REF  27 LAST 146     01,2750  57'401 0           XCH     LST1 +1                INTERVAL 81.91 SEC FOR ENDTASK.
 0183  REF  28 LAST 146     01,2751  57'400 1           XCH     LST1
 0184  REF  11 LAST 109     01,2752  6 7637 1           AD      POSMAX             2. SET T3 = 1.0 - T2 -T USING LIST 1.
 0185  REF   3 LAST 141     01,2753  26 026 1           ADS     TIME3              SO T3 WONT TICK DURING UPDATE.
 0186  REF   2 LAST  17     01,2754  55'070 0           TS      RUPTAGN
 0187  REF  42 LAST 137     01,2755  4 7665 1           CS      ZERO
 0188  REF   3 LAST 146     01,2756  55'070 0           TS      RUPTAGN            SETS RUPTAGN TO +1 ON OVERFLOW.

 0189                       01,2757  0 0006 1           EXTEND                     DISPATCH TASK.
 0190  REF   2 LAST 142     01,2760  4 4570 0           DCS     ENDTASK
 0191  REF  10 LAST 142     01,2761  53'431 1           DXCH    LST2 +16D
 0192  REF  11 LAST 146     01,2762  53'427 0           DXCH    LST2 +14D
 0193  REF  12 LAST 146     01,2763  53'425 1           DXCH    LST2 +12D
 0194  REF  13 LAST 146     01,2764  53'423 1           DXCH    LST2 +10D
 0195  REF  14 LAST 146     01,2765  53'421 0           DXCH    LST2 +8D
 0196  REF  15 LAST 146     01,2766  53'417 0           DXCH    LST2 +6
 0197  REF  16 LAST 146     01,2767  53'415 1           DXCH    LST2 +4
 0198  REF  17 LAST 146     01,2770  53'413 1           DXCH    LST2 +2
 0199  REF  18 LAST 146     01,2771  53'411 0           DXCH    LST2

 0200                       01,2772  52 006 0           DTCB

 0201                                01,2773  ENDWAITS EQUALS
```

```
P0202                RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK:

 0203                                   4602            BLOCK   02

 0204   REF   4 LAST 146          4602  11 070 0  TASKOVER CCS     RUPTAGN          IF +1 RETURN TO T3RUPT, IF -0 RESUME.
 0205   REF   2 LAST 139          4603  3 4553 0           CAF     WAITBB
 0206   REF  16 LAST 139          4604  54 006 0           TS      BBANK
 0207   REF   1                   4605  1 2741 0           TCF     T3RUPT2          DISPATCH NEXT TASK IF IT WAS DUE.

 0208                             4606  0 0006 1  RESUME   EXTEND
 0209   REF   3 LAST 146          4607  22 012 1           QXCH    QRUPT
 0210   REF   2 LAST 146          4610  3 0016 0  NOQRSM   CA      BANKRUPT
 0211   REF  17 LAST 147          4611  54 006 0           TS      BBANK
 0212   REF  11 LAST  28          4612  52 011 0  NOQBRSM  DXCH    ARUPT
 0213                             4613  50 017 1           RESUME

 0214                                   4614  ENDWAITF EQUALS                   LAST FIXED-FIXED LOCATION OF T3RUPT.
```

```
L       PHASE TABLE MAINTENANCE                                                   USER'S OWN PAGE NO.    1

R0001            THE FOLLOWING ROUTINES ARE PROVIDED TO MAINTAIN THE PHASE TABLE. TWO ROUTINES ARE AVAILABLE:

A0003                                                    TC     PHASCHNG        SLOWER BUT LESS STORAGE.
A0004                                                    OCT    PPPGG           CHANGE RESTART GROUP GG TO PHASE PPP
A0005                                                                           (PPP IS A SIGNED 8 BIT NUMBER).

A0006                                                    CA     PPPPP           NEW PHASE ARRIVES IN A.
A0007                                                    TC     NEWPHASE
A0008                                                    OCT    000GG           UPDATES GG.

R0009            IN ALL CASES THE OLD PHASE RETURNS IN A. IF THE OLD PHASE WAS NEGATIVE, CALL A ROUTINE USING THE
R0011   CORRESPONDING TERMCADR.

 0012   REF   1                           4614           SETLOC ENDWAITF

 0013                           4614  0 0004 0  PHASCHNG INHINT
 0014   REF  90 LAST 145        4615  50 002 0           INDEX  Q
 0015                           4616  3 0000 1           CAF    0               GET PARAMETER WORD.
 0016   REF   5 LAST  32        4617  54 077 0           TS     RUPTREG4
 0017   REF   1                 4620  7 5224 1           MASK   LOW5            GROUP NUMBER 0 - 37.
 0018                           4621  6 0000 1           DOUBLE
 0019   REF   6 LAST 148        4622  56 077 1           XCH    RUPTREG4
 0020                           4623  0 0006 1           EXTEND
 0021   REF   1                 4624  7 7647 1           MP     BIT9            SIGNED NEW PHASE.
 0022   REF   1                 4625  1 4634 0           TCF    PHASCH2

 0023                           4626  0 0004 0  NEWPHASE INHINT                 NEW PHASE ARRIVES IN A.
 0024   REF   7 LAST 148        4627  54 077 0           TS     RUPTREG4
 0025   REF  91 LAST 148        4630  50 002 0           INDEX  Q
 0026                           4631  3 0000 1           CAF    0               GROUP NUMBER.
 0027                           4632  6 0000 1           DOUBLE
 0028   REF   8 LAST 148        4633  56 077 1           XCH    RUPTREG4

 0029   REF  24 LAST 139        4634  54 001 1  PHASCH2  TS     L               DIRECT VERSION.
 0030                           4635  4 0000 0           COM                    COMPLEMENTED VERSION IMMEDIATELY PRE-
 0031   REF   9 LAST 148        4636  50 077 1           INDEX  RUPTREG4        CEDES THE DIRECT ONE.
 0032   REF   1                 4637  53'072 1           DXCH   -PHASE0         COPIES DISAGREE FOR MINIMUM TIME.
 0033                           4640  0 0006 1           EXTEND
 0034   REF   1                 4641  6 4655 0           BZMF   PHASEXIT        IF NO DERAIL.
```

```
L       PHASE TABLE MAINTENANCE                                                   USER'S OWN PAGE NO.   2

 0035   REF    1                  4642  54 074 0           TS      RUPTREG1       IF NEGATIVE, SAVE ABSOLUTE VALUE OF
 0036                             4643  0 0006 1           EXTEND                 OLD PHASE AND RETURN Q.
 0037   REF    1                  4644  22 075 0           QXCH    RUPTREG2
 0038   REF   10 LAST 148         4645  3 0077 1           CA      RUPTREG4       GET BACK GROUP NUMBER.
 0039                             4646  0 0006 1           EXTEND
 0040   REF   15 LAST 123         4647  7 7642 1           MP      HALF
 0041   REF   64 LAST 144         4650  50 000 1           INDEX   A              SELECT TERMCADR.
 0042   REF    1                  4651  3 4661 1           CAF     TERMCADR
 0043   REF    1                  4652  0 4162 0           TC      ISWCALL

 0044   REF    2 LAST 149         4653  52 075 1           DXCH    RUPTREG1       -OLD PHASE BITS TO A - RETURN -1 TO L.
 0045   REF   92 LAST 148         4654  22 002 0           LXCH    Q

 0046                             4655  4 0000 0  PHASEXIT COM                    RETURN OLD PHASE IN A.
 0047                             4656  0 0003 1           RELINT
 0048   REF   93 LAST 149         4657  50 002 0           INDEX   Q
 0049                             4660  0 0001 0           TC      1

 0050                             4661   00000 1  TERMCADR CADR    10000          FILLED IN AS NEEDED.
 0051                             4662   00000 1           CADR    10000
 0052                             4663   00000 1           CADR    10000
 0053                             4664   00000 1           CADR    10000
 0054                             4665   00000 1           CADR    10000
 0055                             4666   00000 1           CADR    10000
```

```
L         PHASE TABLE MAINTENANCE                                                         USER'S OWN PAGE NO.   3

P0056                SUBROUTINE TO UPDATE THE PROGRAM NUMBER DISPLAY ON THE DSKY.

 0057    REF  94 LAST 149         4667  50 002 0  NEWMODEX INDEX   Q                    UPDATE MODREG.
 0058                             4670  3 0000 1           CAF     0
 0059    REF  95 LAST 150         4671  24 002 0           INCR    Q
 0060    REF   1                  4672  56 276 1           XCH     MODREG
 0061                             4673  4 0000 0           COM                          IF NO CHANGE IN MODE, RETURN IMMEDIATELY
 0062    REF   2 LAST 150         4674  6 0276 1           AD      MODREG
 0063                             4675  0 0006 1           EXTEND
 0064    REF   1                  4676  1 4712 0           BZF     TCQ

 0065                             4677  3 4701 0           CAF     +2                   CALL PINBALL SUBROUTINE.
 0066    REF   1                  4700  1 4067 0           TCF     SWCALL               WITH Q SET TO CALLERS RETURN.

 0067    REF   1                  4701    12001 0          CADR    DSPMM

R0068                RETURN TO CALLER +3 IF MODE = THAT AT CALLER +1. OTHERWISE RETURN TO CALLER +2.

 0070    REF  96 LAST 150         4702  50 002 0  CHECKMM  INDEX   Q
 0071                             4703  4 0000 0           CS      0
 0072    REF   3 LAST 150         4704  6 0276 1           AD      MODREG
 0073                             4705  0 0006 1           EXTEND
 0074                             4706  1 4711 0           BZF     +3

 0075    REF  97 LAST 150         4707  50 002 0           INDEX   Q
 0076                             4710  0 0001 0           TC      1                    NO MATCH.

 0077    REF  98 LAST 150         4711  50 002 0           INDEX   Q
 0078                             4712  0 0002 0  TCQ      TC      2                    (ALWAYS AVAILABLE TO BZF & BZMF)

 0079                                      4713   ENDPHMNF EQUALS
```

```
L        FRESH START AND RESTART                                                                  USER'S OWN PAGE NO.   1

 0001                                 12,2000                BANK     12
 0002     REF   29 LAST 146                E3                EBANK=  LST1

 0003                      12,2000  0 0004 0  SLAP1      INHINT                    FRESH START. COMES HERE FROM PINBALL.
 0008     REF    1         12,2001  0 2214 1             TC       STARTSUB         SUBROUTINE DOES MOST OF THE WORK.

 0009     REF    7 LAST 120 12,2002  3 7641 0            CAF      BIT15            TURN OFF ALL DSPTAB +11D LAMPS ONLY ON
 0010     REF    1         12,2003  54 322 0             TS       DSPTAB +11D      REQUESTED FRESH START.

 0011     REF   43 LAST 146 12,2004  3 7665 0            CAF      ZERO             SAME STORY ON ZEROING FAILREG.
 0012     REF    1         12,2005  55'363 1             TS       FAILREG

 0019     REF   44 LAST 151 12,2006  3 7665 0  DOFSTART CAF      ZERO             DO A FRESH START.
 0020     REF    1         12,2007  55'361 0             TS       SMODE
 0021     REF    4 LAST 150 12,2010  54 276 0            TS       MODREG
 0022     REF    1         12,2011  54 412 1             TS       AGSWORD          ALLOW AGS INITIALIZATION
 0023     REF    1         12,2012  54 342 0             TS       UPLOCK           FREE UPLINK INTERLOCK

 00231    REF    1         12,2013  54 032 1             TS       CDUX             ZERO CDUS SO MATRIX COMPUTATION IN T4
 00232    REF    1         12,2014  54 033 0             TS       CDUY             WONT OVERFLOW.
 00233    REF    1         12,2015  54 034 1             TS       CDUZ

 0024     REF    1         12,2016  55'072 1             TS       PHASE0           INITIALIZE PHASE TABLE - NO MISSION
 0025     REF    1         12,2017  55'074 1             TS       PHASE1           PROGRAMS RUNNING.
 0026     REF    1         12,2020  55'076 0             TS       PHASE2
 0027     REF    1         12,2021  55'100 0             TS       PHASE3
 0028     REF    1         12,2022  55'102 1             TS       PHASE4
 0029     REF    1         12,2023  55'104 1             TS       PHASE5

 0030                      12,2024  4 0000 0             COM
 0031     REF    2 LAST 148 12,2025  55'071 1            TS       -PHASE0
 0032     REF    1         12,2026  55'073 0             TS       -PHASE1
 0033     REF    1         12,2027  55'075 0             TS       -PHASE2
 0034     REF    1         12,2030  55'077 1             TS       -PHASE3
 0035     REF    1         12,2031  55'101 1             TS       -PHASE4
 0036     REF    1         12,2032  55'103 0             TS       -PHASE5

 0037     REF    1         12,2033  3 2433 1             CAF      IM30INIF         FRESH START IMU INITIALIZATION.
 0038     REF    1         12,2034  54 367 1             TS       IMODES30

 0039     REF    5 LAST 138 12,2035  3 7646 1            CAF      BIT10            REMOVE IMU FAIL INHIBIT IN 5 SECS.
 0040     REF    1         12,2036  0 4536 0             TC       WAITLIST
 0041                      12,2037    02247 1            2CADR    IFAILOK
C0041     REF    1         12,2040    26003 0
 0042                      12,2041  0 0006 1             EXTEND                    SETTING T5RUPT FOR SETIDLER PROGRAM
 0043     REF    1         12,2042  3 2443 0             DCA      SETADR           THE SETIDLER PROGRAM ASSURES 1 SECOND
 004301   REF    1         12,2043  52 346 1             DXCH     T5ADR            DELAY BEFORE THE DAPIDLER BEGINS.

 004401   REF    1         12,2044  3 2450 1             CAF      OCT04012         INITIALIZE DAPBOOLS
 004402   REF    1         12,2045  54 765 1             TS       DAPBOOLS
```

```
L       FRESH START AND RESTART                                                      USER'S OWN PAGE NO.   2

 0045                        12,2046  0 0006 1           EXTEND               INITIALIZE SWITCHES ONLY ON FRESH START.
 0046   REF   1              12,2047  3 2445 0           DCA     SWINIT
 0047   REF   4 LAST 140     12,2050  52 062 1           DXCH    STATE
 0048                        12,2051  0 0006 1           EXTEND
 0049   REF   2 LAST 152     12,2052  3 2447 1           DCA     SWINIT +2
 0050   REF   5 LAST 152     12,2053  52 064 1           DXCH    STATE +2

 0051   REF   3 LAST  87     12,2054  3 7652 1 ENDRSTRT  CAF     BIT6         IF GIMBAL LOCK LAMP IS STILL ON,
 0052   REF   2 LAST 151     12,2055  7 0322 0           MASK    DSPTAB +11D  IMU WAS FOUND IN GIMBAL LOCK IN RESTART
 0053   REF  65 LAST 149     12,2056  10 000 0           CCS     A            AND LEFT IN COARSE ALIGN. IN THIS CASE
 0054   REF   2 LAST 148     12,2057  4 7647 1           CS      BIT9         SET ISS OPERATE BIT IN IMODES30 TO
 0055   REF   2 LAST 151     12,2060  26 367 1           ADS     IMODES30     OPERATE SO T4 INBIT MONITOR WONT ZERO

 0056                        12,2061  0 0003 1           RELINT               THE CDUS AS IT DOES IN FRESH START.
 0057   REF   1              12,2062  0 4063 0           TC      BANKCALL     DISPLAY MAJOR MODE.
 0058   REF   2 LAST 150     12,2063   12001 0           CADR    DSPMM

 0059   REF   2 LAST 136     12,2064  1 4452 1 STARTSW   TCF     DUMMYJOB +2  PATCH FOR SIMULATION.

 0060   REF   9 LAST 138     12,2065  3 7642 0 STARTSIM  CAF     BIT14
 0061   REF   1              12,2066  0 4374 0           TC      FINDVAC
 0062                        12,2067   77777 0           OCT     77777        FATAL IF NOT PATCHED AS ABOVE.
 0063                        12,2070   77777 0           OCT     77777

 0064   REF   3 LAST 152     12,2071  1 4452 1           TCF     DUMMYJOB +2  DONT ZERO NEWJOB
```

```
P0065           COMES HERE FROM LOCATION 4000, GOJAM. RESTART ANY PROGRAMS WHICH MAY HAVE BEEN RUNNING AT THE TIME.

 0067   REF   1               12,2072  25 362 1  GOPROG   INCR    REDOCTR          ADVANCE RESTART COUNTER.

 0068   REF   2 LAST 151      12,2073  0 2214 1           TC      STARTSUB         COMMON INITIALIZATION ROUTINE.

 0069   REF   1               12,2074  3 2436 1           CAF     9,6              LEAVE PROGRAM ALARM AND GIMBAL LOCK
 0070   REF   3 LAST 152      12,2075  7 0322 0           MASK    DSPTAB +11D      LAMPS INTACT ON RESTART.
 0071   REF   8 LAST 151      12,2076  6 7641 0           AD      BIT15
 0072   REF   4 LAST 153      12,2077  56 322 1           XCH     DSPTAB +11D
 0073   REF   4 LAST 152      12,2100  7 7652 0           MASK    BIT6
 0074   REF  66 LAST 152      12,2101  10 000 0           CCS     A                IF GIMBAL LOCK LAMP WAS ON, LEAVE ISS IN
 0075   REF   2 LAST  76      12,2102  3 7654 1           CAF     BIT4             COARSE ALIGN.
 0076                         12,2103  0 0006 1           EXTEND
 0077                         12,2104  05 012 1           WOR     12

 007701                       12,2105  0 0006 1           EXTEND                   SETTING T5RUPT FOR DAPIDLER PROGRAM
 007702 REF   1               12,2106  3 2441 1           DCA     IDLEADR
 007703 REF   2 LAST 151      12,2107  52 346 1           DXCH    T5ADR
 0078   REF   1               12,2110  3 4535 0           CAF     PRIO37           DISPLAY FAILREG AS INDICATION OF RESTART
 0079   REF   2 LAST 140      12,2111  0 4363 0           TC      NOVAC            OR TO DISPLAY ABORT CODE AS ABOVE.
 0080                         12,2112   02773 0           2CADR   DOALARM
C0080   REF   1               12,2113   02003 0
 0081                         12,2114  0 0006 1           EXTEND                   DONT TRY TO RESTART IF ERROR LIGHT RESET
 0082                         12,2115  00 015 0           READ    15               AND MARK REJECT BUTTONS DEPRESSED.
 0083   REF   1               12,2116  6 2431 0           AD      -ELR
 0084                         12,2117  0 0006 1           EXTEND
 0085                         12,2120  1 2122 0           BZF     +2
 0086   REF   1               12,2121  1 2130 0           TCF     PCLOOP -1        VERIFY PHASE TABLE.

 0087   REF   1               12,2122  3 7653 0           CAF     BIT5
 0088                         12,2123  0 0006 1           EXTEND
 0089                         12,2124  02 016 1           RAND    16
 0090   REF   1               12,2125  6 2432 0           AD      -MKREJ
 0091                         12,2126  0 0006 1           EXTEND
 0092   REF   1               12,2127  1 2006 1           BZF     DOFSTART

 0093   REF   1               12,2130  3 7664 1    -1     CAF     NUMGRPS          VERIFY PHASE TABLE AGREEMENT.
 0094   REF 354 LAST 130      12,2131  54 145 0  PCLOOP   TS      MPAC +5
 0095                         12,2132  6 0000 1           DOUBLE
 0096                         12,2133  0 0006 1           EXTEND
 0097   REF  67 LAST 153      12,2134  5 0000 1           INDEX   A
 0098   REF   3 LAST 151      12,2135  3 1072 0           DCA     -PHASE0          COMPLEMENT INTO A - DIRECT INTO L.
 0099                         12,2136  0 0006 1           EXTEND
 0100   REF  25 LAST 148      12,2137  06 001 0           RXOR    L                RESULT MUST BE -0 FOR AGREEMENT.
 0101   REF  68 LAST 153      12,2140  10 000 0           CCS     A
 0102   REF   1               12,2141  1 2203 0           TCF     PTBAD            RESTART FAILURE.
 0103   REF   2 LAST 153      12,2142  1 2203 0           TCF     PTBAD
 0104   REF   3 LAST 153      12,2143  1 2203 0           TCF     PTBAD
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0105   REF 355 LAST 153     12,2144  10 145 0            CCS      MPAC +5         PROCESS ALL RESTART GROUPS.
0106   REF   2 LAST 153     12,2145   1 2131 1           TCF      PCLOOP

0107   REF 356 LAST 154     12,2146  54 146 0            TS       MPAC +6         SET TO +0.
0108   REF   2 LAST 153     12,2147   3 7664 1           CAF      NUMGRPS         SEE IF ANY GROUPS RUNNING.
0109   REF 357 LAST 154     12,2150  54 145 0  NXTRST    TS       MPAC +5
0110                        12,2151   6 0000 1           DOUBLE
0111   REF  69 LAST 153     12,2152  50 000 1            INDEX    A
0112   REF   2 LAST 151     12,2153  11'072 1            CCS      PHASE0
0113   REF   1              12,2154   1 2177 0           TCF      PACTIVE         PNZ - GROUP ACTIVE.
0114   REF   1              12,2155   1 2172 0           TCF      PINACT          +0 - GROUP NOT RUNNING.

0115   REF 358 LAST 154     12,2156  54 140 0  PTERM     TS       MPAC            NNZ - TERMINATE REQUEST.
0116   REF 359 LAST 154     12,2157  50 145 1            INDEX    MPAC +5         PICK UP RESTART TERMINATE CADR.
0117   REF   1              12,2160   3 2423 0           CAF      RTERMCAD

0118   REF  26 LAST 153     12,2161  54 001 1  PACT2     TS       L
0119   REF 360 LAST 154     12,2162  24 140 1            INCR     MPAC            ABS OF PHASE.
0120   REF   4 LAST 132     12,2163   4 6027 0           CS       LOW7            SEE THAT MAG IS LESS THAN 128.
0121   REF 361 LAST 154     12,2164   7 0140 0           MASK     MPAC
0122   REF  70 LAST 154     12,2165  10 000 0            CCS      A
0123   REF   4 LAST 153     12,2166   1 2203 0           TCF      PTBAD           BAD DATA.

0124   REF 362 LAST 154     12,2167  24 146 1            INCR     MPAC +6         INDICATE GROUP DEMANDS PRESENT.
0125   REF  27 LAST 154     12,2170   3 0001 0           CA       L
0126   REF   2 LAST 150     12,2171   0 4067 1           TC       SWCALL          MUST RETURN TO SWRETURN.

0127   REF 363 LAST 154     12,2172  10 145 0  PINACT    CCS      MPAC +5         PROCESS ALL RESTART GROUPS.
0128   REF   1              12,2173   1 2150 0           TCF      NXTRST

0142   REF 364 LAST 154     12,2174  10 146 0  TSTMPAC6  CCS      MPAC +6         IF NO GROUPS ACTIVE THIS REQUEST, DO A
0143   REF   1              12,2175   1 2207 1           TCF      DORSTART
0144   REF   2 LAST 153     12,2176   1 2006 1           TCF      DOFSTART        FRESH START

0145   REF 365 LAST 154     12,2177  54 140 0  PACTIVE   TS       MPAC
0146   REF 366 LAST 154     12,2200  50 145 1            INDEX    MPAC +5         SELECT RESTART ACTIVE CADR.
0147   REF   1              12,2201   3 2415 0           CAF      RACTCADR
0148   REF   1              12,2202   1 2161 1           TCF      PACT2

0149   REF   1              12,2203   3 2206 1  PTBAD     CAF      OCT1107         SET ADDITIONAL FAILURE TO SHOW PHASE
0150   REF   1              12,2204  55'364 0            TS       SFAIL           TABLE DISAGREEMENT (WILL BE DISPLAYED
0151   REF   3 LAST 154     12,2205   1 2006 1           TCF      DOFSTART        IN R2).

0152                        12,2206    01107 0  OCT1107   OCT      1107            ADDITIONAL ALARM CODE.

0153   REF   1              12,2207   3 2404 0  DORSTART  CAF      IFAILINH        LEAVE IMU FAILURE INHIBITS INTACT ON
0154   REF   3 LAST 152     12,2210   7 0367 1           MASK     IMODES30        RESTART, RESETTING ALL FAILURE CODES.
0155   REF   1              12,2211   6 2434 0           AD       IM30INIR
0156   REF   4 LAST 154     12,2212  54 367 1            TS       IMODES30
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L          FRESH START AND RESTART                                              USER'S OWN PAGE NO.   5
 0157   REF   1                 12,2213  1 2054 0           TCF      ENDRSTRT
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P0164              INITIALIZATION COMMON TO BOTH FRESH START AND RESTART.

 0165   REF  99 LAST 150      12,2214  56 002 0  STARTSUB XCH     Q
 0166   REF  81 LAST 136      12,2215  54 114 1           TS      BUF               EXEC TEMPS ARE AVAILABLE TO US.

 0167   REF  45 LAST 151      12,2216  3 7665 0           CAF     ZERO              ZERO OUTBITS WITHIN 3MS OF RESTART.
 0168                         12,2217  0 0006 1           EXTEND
 0169                         12,2220  01 012 0           WRITE   12
 0170                         12,2221  0 0006 1           EXTEND
 0171                         12,2222  01 014 0           WRITE   14
 0172                         12,2223  0 0006 1           EXTEND
 0173                         12,2224  01 011 0           WRITE   11
 0174   REF   1               12,2225  3 4532 1           CAF     PRIO34            ENABLE INTERRUPTS.
 0175                         12,2226  0 0006 1           EXTEND
 0176                         12,2227  01 013 1           WRITE   13

 0177   REF  12 LAST 146      12,2230  3 7637 1           CAF     POSMAX            T3 AND T4 OVERFLOW AS SOON AS POSSIBLE.
 0178   REF   1               12,2231  54 030 0           TS      TIME5             SO DOES T5.
 0179   REF   4 LAST 146      12,2232  54 026 1           TS      TIME3               (POSMAX IS PSEUDO INTERRUPT SIGNAL IN
 0180   REF   1               12,2233  54 027 0           TS      TIME4               CASE RUPT SIGNALLED BEFORE TS TIME3).

 0181   REF   1               12,2234  3 2414 1           CAF     STARTEB
 0182   REF   1               12,2235  54 003 0           TS      EBANK             SET FOR E3

 0183   REF   3 LAST 146      12,2236  3 7640 1           CAF     NEG1/2            INITIALIZE WAITLIST DELTA-TS.
 0184   REF  30 LAST 151      12,2237  55'407 1           TS      LST1 +7
 0185   REF  31 LAST 156      12,2240  55'406 0           TS      LST1 +6
 0186   REF  32 LAST 156      12,2241  55'405 0           TS      LST1 +5
 0187   REF  33 LAST 156      12,2242  55'404 1           TS      LST1  +4
 0188   REF  34 LAST 156      12,2243  55'403 0           TS      LST1  +3
 0189   REF  35 LAST 156      12,2244  55'402 1           TS      LST1  +2
 0190   REF  36 LAST 156      12,2245  55'401 1           TS      LST1  +1
 0191   REF  37 LAST 156      12,2246  55'400 0           TS      LST1

 0192   REF   3 LAST 146      12,2247  4 4567 0           CS      ENDTASK
 0193   REF  19 LAST 146      12,2250  55'410 1           TS      LST2
 0194   REF  20 LAST 156      12,2251  55'412 0           TS      LST2 +2
 0195   REF  21 LAST 156      12,2252  55'414 0           TS      LST2 +4
 0196   REF  22 LAST 156      12,2253  55'416 1           TS      LST2 +6
 0197   REF  23 LAST 156      12,2254  55'420 1           TS      LST2 +8D
 0198   REF  24 LAST 156      12,2255  55'422 0           TS      LST2 +10D
 0199   REF  25 LAST 156      12,2256  55'424 0           TS      LST2 +12D
 0200   REF  26 LAST 156      12,2257  55'426 1           TS      LST2 +14D
 0201   REF  27 LAST 156      12,2260  55'430 0           TS      LST2 +16D
 0202   REF   4 LAST 156      12,2261  4 4570 0           CS      ENDTASK +1
 0203   REF  28 LAST 156      12,2262  55'411 0           TS      LST2 +1
 0204   REF  29 LAST 156      12,2263  55'413 1           TS      LST2 +3
 0205   REF  30 LAST 156      12,2264  55'415 1           TS      LST2 +5
 0206   REF  31 LAST 156      12,2265  55'417 0           TS      LST2 +7
 0207   REF  32 LAST 156      12,2266  55'421 0           TS      LST2 +9D
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L        FRESH START AND RESTART                                                              USER'S OWN PAGE NO.   7

 0208    REF  33 LAST 156      12,2267  55'423 1                TS      LST2 +11D
 0209    REF  34 LAST 157      12,2270  55'425 1                TS      LST2 +13D
 0210    REF  35 LAST 157      12,2271  55'427 0                TS      LST2 +15D
 0211    REF  36 LAST 157      12,2272  55'431 1                TS      LST2 +17D

 0212    REF  46 LAST 156      12,2273  4 7665 1                CS      ZERO           MAKE ALL EXECUTIVE REGISTER SETS
 0213    REF  20 LAST 135      12,2274  54 153 1                TS      PRIORITY       AVAILABLE.
 0214    REF  21 LAST 157      12,2275  54 167 0                TS      PRIORITY +12D
 0215    REF  22 LAST 157      12,2276  54 203 1                TS      PRIORITY +24D
 0216    REF  23 LAST 157      12,2277  54 217 1                TS      PRIORITY +36D
 0217    REF  24 LAST 157      12,2300  54 233 1                TS      PRIORITY +48D
 0218    REF  25 LAST 157      12,2301  54 247 1                TS      PRIORITY +60D
 0219    REF  26 LAST 157      12,2302  54 263 1                TS      PRIORITY +72D

 0220    REF  16 LAST 137      12,2303  54 067 1                TS      NEWJOB         SHOWS NO ACTIVE JOBS.

 0221    REF   1               12,2304  3 2412 1                CAF     VAC1ADRC       MAKE ALL VAC AREAS AVAILABLE.
 0222    REF   2 LAST 128      12,2305  54 431 0                TS      VAC1USE
 0223    REF   1               12,2306  6 2413 0                AD      LTHVACA
 0224    REF   2 LAST 128      12,2307  54 505 0                TS      VAC2USE
 0225    REF   2 LAST 157      12,2310  6 2413 0                AD      LTHVACA
 0226    REF   2 LAST 128      12,2311  54 561 1                TS      VAC3USE
 0227    REF   3 LAST 157      12,2312  6 2413 0                AD      LTHVACA
 0228    REF   2 LAST 128      12,2313  54 635 0                TS      VAC4USE
 0229    REF   4 LAST 157      12,2314  6 2413 0                AD      LTHVACA
 0230    REF   2 LAST 128      12,2315  54 711 1                TS      VAC5USE

 0231    REF   2 LAST  67      12,2316  3 7661 1                CAF     TEN            TURN OFF ALL DISPLAY SYSTEM RELAYS.
 0232    REF   1               12,2317  54 351 1                TS      DIDFLG         DISPLAY INERTIAL DATA FLAG.
 0233    REF 367 LAST 154      12,2320  54 140 0    DSPOFF      TS      MPAC
 0234    REF   3 LAST 138      12,2321  4 7644 1                CS      BIT12
 0235    REF 368 LAST 157      12,2322  50 140 1                INDEX   MPAC
 0236    REF   5 LAST 153      12,2323  54 307 1                TS      DSPTAB
 0237    REF 369 LAST 157      12,2324  10 140 0                CCS     MPAC
 0238    REF   1               12,2325  0 2320 1                TC      DSPOFF

 0239    REF   1               12,2326  54 045 1                TS      INLINK
 0240    REF   1               12,2327  54 341 0                TS      DSPCNT
 0241    REF   1               12,2330  54 366 0                TS      LMPCMD
 0242    REF   1               12,2331  54 323 1                TS      CADRSTOR
 0243    REF   1               12,2332  54 300 0                TS      REQRET
 0244    REF   1               12,2333  54 302 1                TS      CLPASS
 0245    REF   1               12,2334  54 277 1                TS      DSPLOCK
 0246    REF   1               12,2335  54 305 0                TS      MONSAVE        KILL MONITOR
 0247    REF   1               12,2336  54 306 0                TS      MONSAVE1
 0248    REF   1               12,2337  54 324 0                TS      GRABLOCK
 0249    REF   1               12,2340  54 266 1                TS      VERBREG
 0250    REF   1               12,2341  54 267 0                TS      NOUNREG
 0251    REF   1               12,2342  54 327 0                TS      DSPLIST
 0252    REF   2 LAST 157      12,2343  54 330 0                TS      DSPLIST +1
 0253   REF    3 LAST 157     12,2344   54 331 1             TS       DSPLIST +2

 0254   REF    1              12,2345   54 374 0             TS       MARKSTAT
 0255   REF    1              12,2346   54 332 1             TS       EXTVBACT         MAKE EXTENDED VERBS AVAILABLE
 0256   REF    1              12,2347   54 371 0             TS       IMUCADR
 0257   REF    1              12,2350   54 372 0             TS       OPTCADR
 0258   REF    1              12,2351   54 373 1             TS       RADCADR
 0259   REF    1              12,2352   54 357 1             TS       LGYRO
 0260   REF    1              12,2353   54 350 0             TS       DSRUPTSW
 0261   REF    1              12,2354   3 7660 0             CAF      NOUTCON
 0262   REF    1              12,2355   54 303 0             TS       NOUT

 0263   REF   24 LAST 145     12,2356   4 7657 0             CS       ONE              NO RADAR DESIGNATION.
 0264   REF    1              12,2357   54 414 1             TS       SAMPLIM          NO RADAR RUPTS EXPECTED.

 0265   REF    1              12,2360   3 2411 1             CAF      T4LINIT
 0266   REF    1              12,2361   54 347 0             TS       T4LOC

 0267   REF    1              12,2362   3 2435 1             CAF      IM33INIT         NO PIP OR TM FAILS.
 0268   REF    1              12,2363   54 370 1             TS       IMODES33

 0269   REF    5 LAST 153     12,2364   3 7652 1             CAF      BIT6             SET LR POS.
 0270                         12,2365   0 0006 1             EXTEND
 0271                         12,2366   02 033 0             RAND     33
 0272   REF    1              12,2367   6 2437 0             AD       RMODINIT
 0273   REF    2 LAST  28     12,2370   54 413 0             TS       RADMODES

 0274   REF    1              12,2371   3 2410 0             CAF      LESCHK           SELF CHECK GO-TO REGISTER.
 0275   REF    4 LAST 137     12,2372   55'360 1             TS       SELFRET
 0276   REF    1              12,2373   4 5237 0             CS       VD1
 0277   REF    1              12,2374   54 264 0             TS       DSPCOUNT
 0278   REF    1                                E7           EBANK=   DNTMGOTO

 0279   REF    1              12,2375   3 2406 1             CAF      LDNTMGO          SET UP TM PROGRAM.
 0280   REF    2 LAST 156     12,2376   54 003 0             TS       EBANK

 0281   REF    1              12,2377   3 2405 1             CAF      LDNPHAS1
 0282   REF    2 LAST 158     12,2400   55'401 1             TS       DNTMGOTO

 0283   REF    1              12,2401   3 2407 0             CAF      NOMTMLST         SET UP NOMINAL DOWNLINK LIST.
 0284   REF    1              12,2402   54 411 1             TS       DNLSTADR

 0285   REF   82 LAST 156     12,2403   0 0114 0             TC       BUF

 0289                         12,2404    00035 1  IFAILINH   OCT      35               ISS FAILURE INHIBIT BITS.
 0290   REF    1              12,2405    02052 1  LDNPHAS1   GENADR   DNPHASE1
 0291   REF    3 LAST 158     12,2406    03401 1  LDNTMGO    ECADR    DNTMGOTO
 0292   REF    1              12,2407    02321 0  NOMTMLST   GENADR   NOMDNLST
 0293   REF    2 LAST 137     12,2410    02101 0  LESCHK     GENADR   SELFCHK
 0294   REF    1              12,2411    04730 1  T4LINIT    ADRES    DSKYRSET
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L       FRESH START AND RESTART                                                         USER'S OWN PAGE NO.   9

 0295   REF   3 LAST 157      12,2412   00431 1  VAC1ADRC ADRES   VAC1USE
 0296                         12,2413   00054 0  LTHVACA  DEC     44

 0297   REF  38 LAST 156      12,2414   01400 1  STARTEB  ECADR   LST1
 0298   REF   2 LAST  64                    7664  NUMGRPS  EQUALS  FIVE                   SIX GROUPS CURRENTLY.

R0299             WHERE TO GO ON RESTART IF GROUP ACTIVE:

 0300                         12,2415   00000 1  RACTCADR CADR    10000                  AVAILABLE FOR USE-NEXT ONE USED
 0301   REF   1               12,2416   42764 1           CADR    OPTMSTRT                RESTARTS DURING OPTM ALIGN CALIBRATION
 0302                         12,2417   00000 1           CADR    10000
 0303                         12,2420   00000 1           CADR    10000
 0304                         12,2421   00000 1           CADR    10000
 0305                         12,2422   00000 1           CADR    10000

R0306             WHERE TO GO ON RESTART IF TERMINATE REQUESTED.

 0307                         12,2423   00000 1  RTERMCAD CADR    10000
 0308                         12,2424   00000 1           CADR    10000
 0309                         12,2425   00000 1           CADR    10000
 0310                         12,2426   00000 1           CADR    10000
 0311                         12,2427   00000 1           CADR    10000
 0312                         12,2430   00000 1           CADR    10000

 0313                         12,2431   77755 0  -ELR     OCT     -22                    -ERROR LIGHT RESET KEY CODE.
 0314                         12,2432   77757 1  -MKREJ   OCT     -20                    - MARK REJECT.
 0315                         12,2433   37411 1  IM30INIF OCT     37411                  INHIBITS IMU FAIL FOR 5 SEC AND PIP ISSW
 0316                         12,2434   37400 1  IM30INIR OCT     37400                  LEAVE FAIL INHIBITS ALONE.
 0317                         12,2435   16000 0  IM33INIT OCT     16000                  NO PIP OR TM FAIL SIGNALS.
 0318                         12,2436   00440 1  9,6      OCT     440                    MASK FOR PROG ALARM AND GIMBAL LOCK.
 0319                         12,2437   00102 1  RMODINIT OCT     00102

 031911 REF   1                            E6           EBANK=  DT
 031912                       12,2440   03141 0  IDLEADR  2CADR   DAPIDLER
C031912 REF   1               12,2441   46006 0
 031913 REF   2 LAST 159                   E6           EBANK=  DT
 031914                       12,2442   03115 1  SETADR   2CADR   SETIDLE
C031914 REF   1               12,2443   46006 0
 0320                         12,2444   00000 1  SWINIT   OCT     0
 0321                         12,2445   00000 1           OCT     0
 0322                         12,2446   00000 1           OCT     0
 0323                         12,2447   00000 1           OCT     0

 0324                         12,2450   04012 0  OCT04012 OCTAL   04012                  INITIAL VALUE OF DAPBOOLS
 0325                                   12,2451  ENDFRESS EQUALS
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L      T4RUPT PROGRAM                                                                      USER'S OWN PAGE NO.   1

 0001  REF    1                          4713            SETLOC ENDPHMNF

 0002  REF    2 LAST  27                   E6            EBANK= M11
 0003                          4713  0 0006 1  T4RUPT    EXTEND                  ZERO OUTO EVERY T4RUPT.
 0004  REF    1                4714  01 010 1            WRITE  OUTO             (COMES HERE WITH +0 IN A)

 0005  REF    2 LAST 158       4715  50 347 1            INDEX  T4LOC            NORMALLY TO NORMT4, BUT TO LMPRESET OR
 0006                          4716  1 0000 0            TCF    0                DSKYRSET AFTER OUTO COMMAND.

 0007  REF    2 LAST 158       4717  10 350 0  NORMT4    CCS    DSRUPTSW         GOES 7(-1)0.
 0008                          4720  1 4722 0            TCF    +2
 0009  REF    4 LAST 108       4721  3 7663 0            CAF    SEVEN
 0010  REF    3 LAST 160       4722  54 350 0            TS     DSRUPTSW

 0011  REF    1                4723  3 4023 1            CAF    T4RPTBB          OFF TO SWITCHED BANK
 0012  REF   18 LAST 147       4724  56 006 1            XCH    BBANK
 0013  REF    2 LAST  27       4725  1 2451 1            TCF    T4RUPTA

 0014  REF    1                4726  3 4735 1  LMPRESET  CAF    90MRUPT          30 MS ON / 90 MS OFF.
 0015                          4727  1 4731 1            TCF    +2

 0016  REF    1                4730  3 4736 1  DSKYRSET  CAF    100MRUPT         20 MS ON / 100 MS OFF.
 0017  REF    2 LAST 156       4731  54 027 0            TS     TIME4
 0018  REF    1                4732  3 4737 0            CAF    LNORMT4
 0019  REF    3 LAST 160       4733  54 347 0            TS     T4LOC
 0020  REF    1                4734  1 4612 1            TCF    NOQBRSM

 0021                          4735   37767 0  90MRUPT   DEC    16375
 0022                          4736   37766 1  100MRUPT  DEC    16374
 0023  REF    1                4737   04717 1  LNORMT4   ADRES  NORMT4
 0024                          4740   74000 1  74K       OCT    74000

R0025  RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS, RELAY CODE
R0026  IN LOWER 5 BITS.

 0027                          4741   04025 1  RELTAB    OCT    04025
 0028                          4742   10003 0            OCT    10003
 0029                          4743   14031 0            OCT    14031
 0030                          4744   20033 0            OCT    20033
 0031                          4745   24017 1            OCT    24017
 0032                          4746   30036 1            OCT    30036
 0033                          4747   34034 1            OCT    34034
 0034                          4750   40023 1            OCT    40023
 0035                          4751   44035 1            OCT    44035
 0036                          4752   50037 0            OCT    50037
 0037                          4753   54000 0            OCT    54000
 0038                          4754   60000 1  RELTAB11  OCT    60000
 0039                              4755  ENDT4FF  EQUALS
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L       T4RUPT PROGRAM                                                                        USER'S OWN PAGE NO.  3

P0040             SWITCHED-BANK PORTION.

 0041   REF    1                      12,2451                     SETLOC ENDFRESS

 0042   REF    3 LAST 147    12,2451  54 016 1  T4RUPTA   TS     BANKRUPT
 0043                        12,2452  0 0006 1            EXTEND
 0044   REF    4 LAST 147    12,2453  22 012 1            QXCH   QRUPT

 0045   REF    2 LAST 157    12,2454  10 366 0  LMPOUT    CCS    LMPCMD            SEE IF LMP COMMAND TO BE SENT. IF SO,
 0046   REF    1             12,2455  1 2471 0            TCF    CDRVE             BIT 15 = 1 AND (UP TO) BITS 1 - 11
 0047   REF    2 LAST 162    12,2456  1 2471 0            TCF    CDRVE             CONTAIN THE COMMAND.

 0048   REF    1             12,2457  3 5234 1            CAF    LOW11
 0049   REF    3 LAST 162    12,2460  7 0366 0            MASK   LMPCMD            LEAVE COMMAND PORTION INTACT.
 0050   REF    4 LAST 162    12,2461  54 366 0            TS     LMPCMD
 0051   REF    1             12,2462  6 4740 0            AD     74K
 0052                        12,2463  0 0006 1            EXTEND
 0053   REF    2 LAST 160    12,2464  01 010 1            WRITE  OUT0

 0054   REF    1             12,2465  3 2562 1            CAF    LLMPRS
 0055   REF    4 LAST 160    12,2466  54 347 0            TS     T4LOC
 0056   REF    1             12,2467  3 2563 0            CAF    30MRUPT
 0057   REF    1             12,2470  1 2546 0            TCF    SETTIME4

 0058   REF    6 LAST 157    12,2471  10 322 0  CDRVE     CCS    DSPTAB +11D
 0059   REF    1             12,2472  0 2501 1            TC     DSPOUT
 0060   REF    2 LAST 162    12,2473  0 2501 1            TC     DSPOUT

 0061   REF    7 LAST 162    12,2474  56 322 1            XCH    DSPTAB +11D
 0062   REF    2 LAST 162    12,2475  7 5234 0            MASK   LOW11
 0063   REF    8 LAST 162    12,2476  54 322 0            TS     DSPTAB +11D
 0064   REF    1             12,2477  6 4754 0            AD     RELTAB11
 0065   REF    1             12,2500  0 2541 0            TC     DSPLAYC
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P0066   DSPOUT PROGRAM. PUTS OUT DISPLAYS.

 0067   REF    2 LAST 158    12,2501  10 303 0  DSPOUT    CCS     NOUT            DRIVE DISPLAY SYSTEM RELAYS.
 0068                        12,2502   1 2505 1           TCF     +3

 0069   REF    1             12,2503   3 2522 0  NODSPOUT  CAF     120MRUPT        SET FOR RUPT IN 120 MS IF NO RELAYS.
 0070   REF    2 LAST 162    12,2504   1 2546 0           TCF     SETTIME4

 0071   REF    3 LAST 163    12,2505  54 303 0            TS      NOUT
 0072   REF   47 LAST 157    12,2506   4 7665 1           CS      ZERO
 0073   REF    1             12,2507  54 077 0            TS      DSRUPTEM        SET TO -0 FOR 1ST PASS THRU DSPTAB
 0074   REF    2 LAST 157    12,2510  56 341 1            XCH     DSPCNT
 0075   REF    1             12,2511   6 7666 0           AD      NEG0            TO PREVENT +0
 0076   REF    3 LAST 163    12,2512  54 341 0            TS      DSPCNT
 0077   REF    4 LAST 163    12,2513  50 341 1  DSPSCAN   INDEX   DSPCNT
 0078   REF    9 LAST 162    12,2514  10 307 1            CCS     DSPTAB
 0079   REF    5 LAST 163    12,2515  10 341 0            CCS     DSPCNT          IF DSPTAB ENTRY +, SKIP
 0080   REF    1             12,2516   0 2511 0           TC      DSPSCAN -2      IF DSPCNT +, AGAIN
 0081   REF    1             12,2517   0 2530 0           TC      DSPLAY          IF DSPTAB ENTRY -, DISPLAY
 0082                        12,2520    00012 1  TABLNTH   OCT     12              DEC 10   LENGTH OF DSPTAB
 0083   REF    2 LAST 163    12,2521  10 077 0            CCS     DSRUPTEM        IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
 0084                        12,2522    37764 0  120MRUPT  DEC     16372           (DSPCNT = 0). +0 INTO NOUT.
 0085   REF    4 LAST 163    12,2523  54 303 0            TS      NOUT
 0086   REF    1             12,2524   1 2503 1           TCF     NODSPOUT
 0087   REF    3 LAST 163    12,2525  54 077 0            TS      DSRUPTEM        IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
 0088   REF    1             12,2526   3 2520 1           CAF     TABLNTH         (DSPCNT=0). +0 INTO DSRUPTEM. PASS AGAIN
 0089   REF    2 LAST 163    12,2527   0 2512 0           TC      DSPSCAN -1

 0090   REF   25 LAST 158    12,2530   6 7657 1  DSPLAY    AD      ONE
 0091   REF    6 LAST 163    12,2531  50 341 1            INDEX   DSPCNT
 0092   REF   10 LAST 163    12,2532  54 307 1            TS      DSPTAB          REPLACE POSITIVELY
 0093   REF    3 LAST 162    12,2533   7 5234 0           MASK    LOW11           REMOVE BITS 12 TO 15
 0094   REF    4 LAST 163    12,2534  54 077 0            TS      DSRUPTEM
 0095   REF    1             12,2535   3 5226 1           CAF     HI5
 0096   REF    7 LAST 163    12,2536  50 341 1            INDEX   DSPCNT
 0097   REF    1             12,2537   7 4741 0           MASK    RELTAB          PICK UP BITS 12 TO 15 OF RELTAB ENTRY
 0098   REF    5 LAST 163    12,2540   6 0077 1           AD      DSRUPTEM
 0099                        12,2541   0 0006 1  DSPLAYC   EXTEND
 0100   REF    3 LAST 162    12,2542  01 010 1            WRITE   OUT0

 0101   REF    1             12,2543   3 2561 1           CAF     LDSKYRS
 0102   REF    5 LAST 162    12,2544  54 347 0            TS      T4LOC
 0103   REF    1             12,2545   3 2564 1           CAF     20MRUPT

 0104   REF    3 LAST 160    12,2546  54 027 0  SETTIME4  TS      TIME4
```

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P0105             JUMP TO APPROPRIATE ONCE-PER SECOND (.96 SEC ACTUALLY) ACTIVITY

 0106   REF   4 LAST 160       12,2547  50 350 1  T4JUMP    INDEX  DSRUPTSW
 0107                          12,2550  1 2551 0            TCF    +1

 0108   REF   1                12,2551  0 2565 0            TC     ALTOUT

 0109   REF   1                12,2552  1 3440 0            TCF    RRAUTCHK
 0110   REF   1                12,2553  1 2720 1            TCF    IMUMON
 0111   REF   1                12,2554  1 3545 1            TCF    GPMATRIX
 0112   REF   1                12,2555  0 2632 1            TC     ALTROUT
 0113   REF   2 LAST 164       12,2556  1 3440 0            TCF    RRAUTCHK
 0114   REF   2 LAST 164       12,2557  1 2720 1            TCF    IMUMON
 0115   REF   2 LAST 164       12,2560  1 3545 1            TCF    GPMATRIX
 0116   REF   2 LAST 158       12,2561   04730 1  LDSKYRS   ADRES  DSKYRSET
 0117   REF   1                12,2562   04726 0  LLMPRS    ADRES  LMPRESET

 0118                          12,2563   37775 0  30MRUPT   DEC    16381
 0119                          12,2564   37776 0  20MRUPT   DEC    16382
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P0120   THIS ROUTINE SERVICES THE METER OUTPUTS.


R0121   DIDFLG INDICATES THE STATE OF THE PROGRAM..............
R0122   IF GREATER THAN ZERO, THEN UNABLE TO DISPLAY DATA
R0123   IF EQUAL TO ZERO, THEN THE PROGRAM IS IN USE
R0124   IF LESS THAN ZERO, THEN THE PROGRAM IS ABLE TO BE USED............

 0125   REF   1            12,2565  0 2640 1  ALTOUT    TC       DISINDAT
 0126   REF   2 LAST  76   12,2566  4 7656 1            CS       BIT2
 0127                      12,2567  0 0006 1            EXTEND
 0128                      12,2570  03 014 1            WAND     14               SET UP OUTPUT FOR ALTITUDE
 0129   REF   1            12,2571  10 352 1            CCS      ALT              -1 IF OLD DATA TO BE EXTRAPOLATED.
 0130                      12,2572  1 2576 0            TCF      +4               NEW DATA.
 0131                      12,2573  1 2576 0            TCF      +3
 0132   REF   1            12,2574  1 2602 0            TCF      OLDDATA

 0133   REF   2 LAST 165   12,2575  54 352 1            TS       ALT              CHANGE -0 IN ALT TO +0.
 0134   REF  26 LAST 163   12,2576  4 7657 0            CS       ONE              RESET ALTSAVE.
 0135   REF   3 LAST 165   12,2577  52 353 0            DXCH     ALT
 0136   REF   1            12,2600  52 365 0  ZDATA2    DXCH     ALTSAVE
 0137   REF   1            12,2601  1 2622 1            TCF      NEWDATA

 0138   REF   1            12,2602  3 0354 0  OLDDATA   CA       ALTRATE          USE ALTRATE TO EXTRAPOLATE.
 0139                      12,2603  0 0006 1            EXTEND
 0140   REF   1            12,2604  7 2715 1            MP       ARTOA            RATE APPLIES FOR .96 SEC.
 0141   REF   2 LAST 165   12,2605  6 0365 1            AD       ALTSAVE +1
 0142   REF   3 LAST 165   12,2606  54 365 0            TS       ALTSAVE +1       AND MAYBE SKIP.
 0143   REF  48 LAST 163   12,2607  3 7665 0            CAF      ZERO
 0144   REF   4 LAST 165   12,2610  26 364 1            ADS      ALTSAVE

 0145   REF  13 LAST 156   12,2611  3 7637 1            CAF      POSMAX           FORCE SIGN AGREEMENT ASSUMING ALTSAVE IS
 0146   REF  27 LAST 165   12,2612  6 7657 1            AD       ONE              NOT NEGATIVE. IF IT IS, THE FINAL TS
 0147   REF   5 LAST 165   12,2613  6 0365 1            AD       ALTSAVE +1       WILL NOT SKIP AND WE CAN SET ALTSAVE TO
 0148   REF   6 LAST 165   12,2614  54 365 0            TS       ALTSAVE +1       ZERO IN THAT CASE.
 0149   REF  49 LAST 165   12,2615  3 7665 0            CAF      ZERO
 0150   REF  14 LAST 165   12,2616  6 7637 1            AD       POSMAX
 0151   REF   7 LAST 165   12,2617  6 0364 0            AD       ALTSAVE
 0152   REF   8 LAST 165   12,2620  54 364 1            TS       ALTSAVE
 0153   REF   1            12,2621  1 2712 0            TCF      ZERODATA         ALTSAVE NEGATIVE - SET TO ZERO.

 0154   REF   9 LAST 165   12,2622  10 364 1  NEWDATA   CCS      ALTSAVE          MAKE UP 15 BIT UNSIGNED OUTPUT.
 0155   REF   9 LAST 153   12,2623  3 7641 0            CAF      BIT15            MAJOR PART +1 OR +0.
 0156   REF  10 LAST 165   12,2624  6 0365 1            AD       ALTSAVE +1
 0157   REF   1            12,2625  54 060 0  METEROUT  TS       ALTM
 0158   REF   1            12,2626  3 2716 0            CAF      BITSET
 0159                      12,2627  0 0006 1            EXTEND
 0160                      12,2630  05 014 1            WOR      14
 0161   REF   1            12,2631  1 2711 0            TCF      DONEDID
 0162  REF   2 LAST 165   12,2632  0 2640 1  ALTROUT  TC      DISINDAT
 0163  REF   3 LAST 165   12,2633  3 7656 0           CAF     BIT2
 0164                     12,2634  0 0006 1           EXTEND
 0165                     12,2635  05 014 1           WOR     14             SET UP OUTPUT FOR ALT. RATE
 0166  REF   2 LAST 165   12,2636  3 0354 0           CA      ALTRATE
 0167  REF   1            12,2637  1 2625 0           TCF     METEROUT

 0168  REF   2 LAST 157   12,2640  10 351 1  DISINDAT CCS     DIDFLG
 0169  REF   2 LAST 165   12,2641  1 2711 0           TCF     DONEDID
 0170                     12,2642  1 2643 0           NOOP
 0171  REF   6 LAST 158   12,2643  3 7652 1           CAF     BIT6
 0172                     12,2644  0 0006 1           EXTEND
 0173                     12,2645  02 030 0           RAND    30             CHECK DISPLAY INERTIAL DATA BIT
 0174  REF  71 LAST 154   12,2646  10 000 0           CCS     A
 0175  REF   1            12,2647  1 2706 0           TCF     ALLDONE
 0176  REF   3 LAST 166   12,2650  10 351 1           CCS     DIDFLG
 0177                     12,2651  1 2652 0           NOOP
 0178  REF   1            12,2652  1 2673 0           TCF     GOAGN

 0179  REF   4 LAST  84   12,2653  3 7650 0  FIRSTIME CAF     BIT8
 0180                     12,2654  0 0006 1           EXTEND
 0181                     12,2655  05 012 1           WOR     12             ENABLE DISPLAY INERTIAL DATA
 0182  REF  50 LAST 165   12,2656  3 7665 0           CAF     ZERO
 0183  REF   4 LAST 166   12,2657  54 351 1           TS      DIDFLG
 0184  REF   1            12,2660  54 363 0           TS      LASTXCMD
 0185  REF   1            12,2661  54 362 1           TS      LASTYCMD
 0186  REF   3 LAST  78   12,2662  3 6162 1           CAF     SIX
 0187  REF   2 LAST 151   12,2663  0 4536 0           TC      WAITLIST
 0188                     12,2664   02667 1           2CADR   INTLZE
C0188  REF   1            12,2665   24006 1
 0189  REF   3 LAST 166   12,2666  0 2711 1           TC      DONEDID

 0190  REF   4 LAST 166   12,2667  3 7656 0  INTLZE   CAF     BIT2
 0191                     12,2670  0 0006 1           EXTEND
 0192                     12,2671  05 012 1           WOR     12             ENABLE RR ERROR COUNTER
 0193  REF   5 LAST 140   12,2672  0 4602 1           TC      TASKOVER

 0194  REF   2 LAST 166   12,2673  4 0363 0  GOAGN    CS      LASTXCMD
 0195  REF   1            12,2674  6 0360 1           AD      FORVEL
 0196  REF   1            12,2675  54 054 1           TS      OPTXCMD
 0197  REF   2 LAST 166   12,2676  3 0360 1           CA      FORVEL
 0198  REF   3 LAST 166   12,2677  54 363 0           TS      LASTXCMD
 0199  REF   2 LAST 166   12,2700  4 0362 1           CS      LASTYCMD
 0200  REF   1            12,2701  6 0361 0           AD      LATVEL
 0201  REF   1            12,2702  54 053 0           TS      OPTYCMD
 0202  REF   2 LAST 166   12,2703  3 0361 0           CA      LATVEL
 0203  REF   3 LAST 166   12,2704  54 362 1           TS      LASTYCMD
 0204  REF 100 LAST 156   12,2705  0 0002 0           TC      Q

 0205  REF   1            12,2706  4 2717 0  ALLDONE  CS      DIDRESET       REMOVE DISPLAY INERTIAL DATA AND ECTR.
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0206                          12,2707  0 0006 1            EXTEND
0207                          12,2710  03 012 1            WAND     12              RESET RR ERROR COUNTER
0208   REF   1                12,2711  1 3752 0  DONEDID   TCF      RCSMONIT
0209   REF  51 LAST 166       12,2712  3 7665 0  ZERODATA  CAF      ZERO
0210   REF  28 LAST 154       12,2713  54 001 1            TS       L
0211   REF   1                12,2714  1 2600 1            TCF      ZDATA2

0212                          12,2715   06432 1  ARTOA     DEC      .20469          ALT DUE TO ALTRATE FOR .96 SEC.
0213                          12,2716   06004 0  BITSET    OCT      6004

0214                          12,2717   00202 1  DIDRESET  OCT      202
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P0215               IMU INBIT MONITOR - ENTERED EVERY 480 MS BY T4RUPT.

 0216   REF    5 LAST 154      12,2720  3 0367 0  IMUMON    CA      IMODES30         SEE IF THERE HAS BEEN A CHANGE IN THE
 0217                          12,2721  0 0006 1            EXTEND                   RELEVANT BITS OF CHAN 30.
 0218                          12,2722  06 030 1            RXOR    30
 0219   REF    1               12,2723  7 3412 1            MASK    30RDMSK
 0220                          12,2724  0 0006 1            EXTEND
 0221   REF    1               12,2725  1 2755 0            BZF     TNONTEST         NO CHANGE IN STATUS.

 0222   REF    3 LAST 149      12,2726  54 074 0            TS      RUPTREG1         SAVE BITS WHICH HAVE CHANGED.
 0223   REF    6 LAST 168      12,2727  22 367 0            LXCH    IMODES30         UPDATE IMODES30.
 0224                          12,2730  0 0006 1            EXTEND
 0225   REF   29 LAST 167      12,2731  06 001 0            RXOR    L
 0226   REF    7 LAST 168      12,2732  54 367 1            TS      IMODES30

 0227   REF   28 LAST 165      12,2733  4 7657 0            CS      ONE
 0228   REF    4 LAST 168      12,2734  56 074 1            XCH     RUPTREG1
 0229                          12,2735  0 0006 1            EXTEND
 0230   REF    1               12,2736  6 3205 0            BZMF    TLIM             CHANGE IN IMU TEMP.
 0231   REF    1               12,2737  1 2741 0            TCF     NXTIFBIT         BEGIN BIT SCAN.

 0232   REF   29 LAST 168      12,2740  6 7657 1   -1       AD      ONE              (RE-ENTERS HERE FROM NXTIFAIL.)
 0233   REF    5 LAST 168      12,2741  24 074 1  NXTIFBIT  INCR    RUPTREG1         ADVANCE BIT POSITION NUMBER.
 0234                          12,2742  6 0000 1   +1       DOUBLE
 0235   REF   72 LAST 166      12,2743  54 000 0            TS      A                SKIP IF OVERFLOW.
 0236   REF    2 LAST 168      12,2744  1 2741 0            TCF     NXTIFBIT         LOOK FOR BIT.

 0237   REF    2 LAST 149      12,2745  56 075 0            XCH     RUPTREG2         SAVE OVERFLOW-CORRECTED DATA.
 0238   REF    6 LAST 168      12,2746  50 074 1            INDEX   RUPTREG1         SELECT NEW VALUE OF THIS BIT.
 0239   REF   10 LAST 152      12,2747  3 7642 0            CAF     BIT14
 0240   REF    8 LAST 168      12,2750  7 0367 1            MASK    IMODES30
 0241   REF    7 LAST 168      12,2751  50 074 1            INDEX   RUPTREG1
 0242   REF    1               12,2752  0 3406 0            TC      IFAILJMP

 0243   REF    3 LAST 168      12,2753  10 075 1  NXTIFAIL  CCS     RUPTREG2         PROCESS ANY ADDITIONAL CHANGES.
 0244   REF    3 LAST 168      12,2754  1 2740 1            TCF     NXTIFBIT -1

 0245   REF    9 LAST 168      12,2755  4 0367 1  TNONTEST  CS      IMODES30         AFTER PROCESSING ALL CHANGES, SEE IF IT
 0246   REF    3 LAST 125      12,2756  7 7651 0            MASK    BIT7             IS TIME TO ACT ON A TURN-ON SEQUENCE.
 0247   REF   73 LAST 168      12,2757  10 000 0            CCS     A
 0248   REF    1               12,2760  1 3103 1            TCF     C33TEST          NO - EXAMINE CHANNEL 33.

 0249   REF    5 LAST 166      12,2761  3 7650 0            CAF     BIT8             SEE IF FIRST SAMPLE OR SECOND.
 0250   REF   10 LAST 168      12,2762  7 0367 1            MASK    IMODES30
 0251   REF   74 LAST 168      12,2763  10 000 0            CCS     A
 0252   REF    1               12,2764  1 2770 1            TCF     PROCTNON         REACT AFTER SECOND SAMPLE.

 0253   REF    6 LAST 168      12,2765  3 7650 0            CAF     BIT8             IF FIRST SAMPLE, SET BIT TO REACT NEXT
 0254   REF   11 LAST 168      12,2766  26 367 1            ADS     IMODES30         TIME.
 0255   REF    2 LAST 168      12,2767  1 3103 1            TCF     C33TEST
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P0256            PROCESS IMU TURN-ON REQUESTS AFTER WAITING 1 SAMPLE FOR ALL SIGNALS TO ARRIVE.

 0258   REF   1               12,2770  4 3430 1  PROCTNON CS      BITS768
 0259   REF  12 LAST 168      12,2771  7 0367 1           MASK    IMODES30
 0260   REF  13 LAST 169      12,2772  54 367 1           TS      IMODES30
 0261   REF  11 LAST 168      12,2773  7 7642 1           MASK    BIT14         SEE IF TURN-ON REQUEST.
 0262   REF  75 LAST 168      12,2774  10 000 0           CCS     A
 0263   REF   1               12,2775  1 3066 0           TCF     OPONLY        OPERATE ON ONLY.

 0264   REF  14 LAST 169      12,2776  4 0367 1           CS      IMODES30      IF TURN-ON REQUEST, WE SHOULD HAVE IMU
 0265   REF   3 LAST 152      12,2777  7 7647 1           MASK    BIT9          OPERATE.
 0266   REF  76 LAST 169      12,3000  10 000 0           CCS     A
 0267                         12,3001  1 3004 1           TCF     +3

 0268   REF   1               12,3002  0 5413 1           TC      ALARM         ALARM IF NOT.
 0269                         12,3003   00213 1           OCT     213

 0270   REF   1               12,3004  0 3373 0    +3     TC      CAGESUB
 0271   REF   1               12,3005  3 3436 0           CAF     90SECS
 0272   REF   3 LAST 166      12,3006  0 4536 0           TC      WAITLIST
 0273                         12,3007   03014 1           2CADR   ENDTNON
C0273   REF   1               12,3010   24006 1
 0274   REF   3 LAST 168      12,3011  1 3103 1           TCF     C33TEST

 0275   REF   2 LAST 169      12,3012  3 3436 0  RETNON   CAF     90SECS
 0276   REF   1               12,3013  0 4557 1           TC      VARDELAY

 0277   REF   5 LAST 166      12,3014  4 7656 1  ENDTNON  CS      BIT2          RESET TURN-ON REQUEST FAIL BIT.
 0278   REF  15 LAST 169      12,3015  7 0367 1           MASK    IMODES30
 0279   REF  16 LAST 169      12,3016  56 367 0           XCH     IMODES30
 0280   REF   6 LAST 169      12,3017  7 7656 1           MASK    BIT2          IF IT WAS OFF, SEND ISS DELAY COMPLETE.
 0281                         12,3020  0 0006 1           EXTEND
 0282   REF   1               12,3021  1 3034 1           BZF     ENDTNON2

 0283   REF  12 LAST 169      12,3022  3 7642 0           CAF     BIT14         IF IT WAS ON AND TURN-ON REQUEST NOW
 0284   REF  17 LAST 169      12,3023  7 0367 1           MASK    IMODES30      PRESENT, RE-ENTER 90 SEC DELAY IN WL.
 0285                         12,3024  0 0006 1           EXTEND
 0286   REF   1               12,3025  1 3012 0           BZF     RETNON

 0287   REF   6 LAST 152      12,3026  4 0061 1           CS      STATE         IF IT IS NOT ON NOW, SEE IF A PROG WAS
 0288   REF   1               12,3027  7 7650 1           MASK    IMUSEFLG      WAITING.
 0289   REF  77 LAST 169      12,3030  10 000 0           CCS     A
 0290   REF   6 LAST 166      12,3031  1 4602 0           TCF     TASKOVER
 0291   REF   1               12,3032  0 4102 0           TC      POSTJUMP
 0292   REF   1               12,3033   26641 0           CADR    IMUBAD        UNSUCCESSFUL TURN-ON.

 0293   REF  10 LAST 165      12,3034  3 7641 0  ENDTNON2 CAF     BIT15         SEND ISS DELAY COMPLETE.
 0294                         12,3035  0 0006 1           EXTEND
 0295                         12,3036  05 012 1           WOR     12
 0296  REF   1          12,3037  0 4755 1  UNZ2    TC      ZEROICDU

 0297  REF   1          12,3040  4 3425 0          CS      BITS4&5     REMOVE ZERO AND COARSE.
 0298                   12,3041  0 0006 1          EXTEND
 0299                   12,3042  03 012 1          WAND    12

 0300  REF   1          12,3043  3 4762 0          CAF     3SECS       ALLOW 3 SECS FOR COUNTER TO FIND GIMBAL.
 0301  REF   2 LAST 169 12,3044  0 4557 1          TC      VARDELAY

 0302  REF   1          12,3045  4 3426 0  ISSUP   CS      OCT54       REMOVE CAGING, IMU FAIL INHIBIT, AND
 0303  REF  18 LAST 169 12,3046  7 0367 1          MASK    IMODES30    ICDUFAIL INHIBIT FLAGS.
 0304  REF  19 LAST 170 12,3047  54 367 1          TS      IMODES30

 0305  REF   1          12,3050  0 3344 1          TC      SETISSW     ISS WARNING MIGHT HAVE BEEN INHIBITED.

 0306  REF  11 LAST 169 12,3051  4 7641 1          CS      BIT15       REMOVE IMU DELAY COMPLETE DISCRETE.
 0307                   12,3052  0 0006 1          EXTEND
 0308                   12,3053  03 012 1          WAND    12

 0309  REF   5 LAST 138 12,3054  3 7645 1          CAF     BIT11       DONT ENABLE PROG ALARM ON PIP FAIL FOR
 0310  REF   4 LAST 169 12,3055  0 4536 0          TC      WAITLIST    ANOTHER 10 SECS.
 0311                   12,3056   02262 0          2CADR   PFAILOK
C0311  REF   1          12,3057   26006 0
 0312  REF   7 LAST 169 12,3060  4 0061 1          CS      STATE       SEE IF ANYONE IS WAITING FOR THE IMU AT
 0313  REF   2 LAST 169 12,3061  7 7650 1          MASK    IMUSEFLG    IMUZERO. IF SO, WAKE THEM UP.
 0314  REF  78 LAST 169 12,3062  10 000 0          CCS     A
 0315  REF   7 LAST 169 12,3063  1 4602 0          TCF     TASKOVER

 0316  REF   2 LAST 169 12,3064  0 4102 0          TC      POSTJUMP
 0317  REF   1          12,3065   26633 0          CADR    ENDIMU

 0318  REF   3 LAST 170 12,3066  3 7650 0  OPONLY  CAF     IMUSEFLG    IF OPERATE ON ONLY, ZERO THE COUNTERS
 0319  REF   8 LAST 170 12,3067  7 0061 1          MASK    STATE       UNLESS SOMEONE IS USING THE IMU.
 0320  REF  79 LAST 170 12,3070  10 000 0          CCS     A
 0321  REF   4 LAST 169 12,3071  1 3103 1          TCF     C33TEST

 0322  REF   1          12,3072  0 3401 1          TC      CAGESUB2    SET TURNON FLAGS.

 0323  REF   2 LAST 153 12,3073  3 7653 0          CAF     BIT5
 0324                   12,3074  0 0006 1          EXTEND
 0325                   12,3075  05 012 1          WOR     12

 0326  REF   7 LAST 166 12,3076  3 7652 1          CAF     BIT6        WAIT 300 MS FOR AGS TO RECEIVE SIGNAL.
 0327  REF   5 LAST 170 12,3077  0 4536 0          TC      WAITLIST
 0328                   12,3100   03037 0          2CADR   UNZ2
C0328  REF   1          12,3101   24006 1
 0329  REF   5 LAST 170 12,3102  1 3103 1          TCF     C33TEST
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L        T4RUPT PROGRAM                                                                          USER'S OWN PAGE NO.  12

P0330           MONITOR CHANNEL 33 FLIP-FLOP INPUTS.

 0331    REF   2 LAST 158       12,3103   3 0370 0  C33TEST   CA       IMODES33          SEE IF RELEVANT CHAN 33 BITS HAVE
 0332    REF   1                12,3104   7 4515 0            MASK     33RDMSK
 0333    REF  30 LAST 168       12,3105   54 001 1            TS       L                 CHANGED.
 0334    REF   2 LAST 171       12,3106   3 4515 1            CAF      33RDMSK
 0335                           12,3107   0 0006 1            EXTEND
 0336                           12,3110   03 033 1            WAND     33                RESETS FLIP-FLOP INPUTS.
 0337                           12,3111   0 0006 1            EXTEND
 0338    REF  31 LAST 171       12,3112   06 001 0            RXOR     L
 0339                           12,3113   0 0006 1            EXTEND
 0340    REF   1                12,3114   1 3143 0            BZF      GLOCKMON          ON NO CHANGE.

 0341    REF   8 LAST 168       12,3115   54 074 0            TS       RUPTREG1          SAVE BITS WHICH HAVE CHANGED.
 0342    REF   3 LAST 171       12,3116   22 370 0            LXCH     IMODES33
 0343                           12,3117   0 0006 1            EXTEND
 0344    REF  32 LAST 171       12,3120   06 001 0            RXOR     L
 0345    REF   4 LAST 171       12,3121   54 370 1            TS       IMODES33          UPDATED IMODES33.

 0346    REF  52 LAST 167       12,3122   3 7665 0            CAF      ZERO
 0347    REF   9 LAST 171       12,3123   56 074 1            XCH      RUPTREG1
 0348                           12,3124   6 0000 1            DOUBLE
 0349    REF   1                12,3125   1 3130 1            TCF      NXTIBT +1         SCAN FOR BIT CHANGES.

 0350    REF  30 LAST 168       12,3126   6 7657 1   -1       AD       ONE
 0351    REF  10 LAST 171       12,3127   24 074 1  NXTIBT    INCR     RUPTREG1
 0352                           12,3130   6 0000 1   +1       DOUBLE
 0353    REF  80 LAST 170       12,3131   54 000 0            TS       A                 (CODING IDENTICAL TO CHAN 30).
 0354    REF   2 LAST 171       12,3132   1 3127 1            TCF      NXTIBT

 0355    REF   4 LAST 168       12,3133   56 075 0            XCH      RUPTREG2
 0356    REF  11 LAST 171       12,3134   50 074 1            INDEX    RUPTREG1          GET NEW VALUE OF BIT WHICH CHANGED.
 0357    REF   4 LAST 138       12,3135   3 7643 1            CAF      BIT13
 0358    REF   5 LAST 171       12,3136   7 0370 1            MASK     IMODES33
 0359    REF  12 LAST 171       12,3137   50 074 1            INDEX    RUPTREG1
 0360    REF   1                12,3140   0 3414 0            TC       C33JMP

 0361    REF   5 LAST 171       12,3141   10 075 1  NXTFL33   CCS      RUPTREG2          PROCESS POSSIBLE ADDITIONAL CHANGES.
 0362    REF   3 LAST 171       12,3142   1 3126 0            TCF      NXTIBT -1
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P0363               MONITOR FOR GIMBAL LOCK.

 0364   REF    2 LAST 151     12,3143   10 034 1  GLOCKMON CCS      CDUZ
 0365   REF    1              12,3144    1 3150 1           TCF      GLOCKCHK            SEE IF MAGNITUDE OF MGA IS GREATER THAN
 0366   REF    1              12,3145    1 3156 1           TCF      SETGLOCK            70 DEGREES.
 0367   REF    2 LAST 172     12,3146    1 3150 1           TCF      GLOCKCHK
 0368   REF    2 LAST 172     12,3147    1 3156 1           TCF      SETGLOCK

 0369   REF    1              12,3150    6 3203 0  GLOCKCHK AD       -70DEGS
 0370                         12,3151    0 0006 1           EXTEND
 0371   REF    3 LAST 172     12,3152    6 3155 0           BZMF     SETGLOCK -1         NO LOCK.

 0372   REF    8 LAST 170     12,3153    3 7652 1           CAF      BIT6                GIMAL LOCK.
 0373   REF    4 LAST 172     12,3154    1 3156 1           TCF      SETGLOCK

 0374   REF   53 LAST 171     12,3155    3 7665 0   -1      CAF      ZERO
 0375   REF   11 LAST 163     12,3156    6 0322 1  SETGLOCK AD       DSPTAB +11D         SEE IF PRESENT STATE OF GIMBAL LOCK LAMP
 0376   REF    9 LAST 172     12,3157    7 7652 0           MASK     BIT6                AGREES WITH DESIRED STATE BY HALF ADDING
 0377                         12,3160    0 0006 1           EXTEND                       THE TWO.
 0378   REF    1              12,3161    1 3752 0           BZF      GLOCKOK             OK AS IS.

 0379   REF   12 LAST 172     12,3162    7 0322 0           MASK     DSPTAB +11D         IF OFF, DONT TURN ON IF IMU BEING CAGED.
 0380   REF   81 LAST 171     12,3163   10 000 0            CCS      A
 0381   REF    1              12,3164    1 3200 1           TCF      GLAMPTST            TURN OFF UNLESS LAMP TEST IN PROGRESS.

 0382   REF   10 LAST 172     12,3165    3 7652 1           CAF      BIT6
 0383   REF   20 LAST 170     12,3166    7 0367 1           MASK     IMODES30
 0384   REF   82 LAST 172     12,3167   10 000 0            CCS      A
 0385   REF    2 LAST 172     12,3170    1 3752 0           TCF      GLOCKOK

 0386   REF   13 LAST 172     12,3171    4 0322 0  GLINVERT CS       DSPTAB +11D         INVERT GIMBAL LOCK LAMP.
 0387   REF   11 LAST 172     12,3172    7 7652 0           MASK     BIT6
 0388   REF   12 LAST 170     12,3173    6 7641 0           AD       BIT15               TO INDICATE CHANGE IN DSPTAB +11D.
 0389   REF   14 LAST 172     12,3174   56 322 1            XCH      DSPTAB +11D
 0390   REF    1              12,3175    7 3204 0           MASK     OCT37737
 0391   REF   15 LAST 172     12,3176   26 322 0            ADS      DSPTAB +11D
 0392   REF    3 LAST 172     12,3177    1 3752 0           TCF      GLOCKOK

 0393   REF    1              12,3200    0 3417 0  GLAMPTST TC       LAMPTEST            TURN OFF UNLESS LAMP TEST IN PROGRESS.
 0394   REF    4 LAST 172     12,3201    1 3752 0           TCF      GLOCKOK
 0395   REF    1              12,3202    1 3171 1           TCF      GLINVERT

 0396                         12,3203     63434 1  -70DEGS  DEC      -.38888             -70 DEGREES SCALED IN HALF-REVOLUTIONS.
 0397                         12,3204     37737 0  OCT37737 OCT      37737
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L       T4RUPT PROGRAM                                                          USER'S OWN PAGE NO.  14

P0398          SUBROUTINES TO PROCESS INBIT CHANGES. NEW VALUE OF BIT ARRIVES IN A, EXCEPT FOR TLIM.

 0400   REF  15 LAST 165     12,3205   7 7637 0  TLIM      MASK    POSMAX            REMOVE BIT FROM WORD OF CHANGES AND SET
 0401   REF   6 LAST 171     12,3206  54 075 1             TS      RUPTREG2          DSKY TEMP LAMP ACCORDINGLY.

 0402   REF  21 LAST 172     12,3207  10 367 1             CCS     IMODES30
 0403   REF   1              12,3210   1 3216 0            TCF     TEMPOK
 0404   REF   2 LAST 173     12,3211   1 3216 0            TCF     TEMPOK

 0405   REF   3 LAST 153     12,3212   3 7654 1            CAF     BIT4              TURN ON LAMP.
 0406                        12,3213   0 0006 1            EXTEND
 0407                        12,3214  05 011 1             WOR     11
 0408   REF   1              12,3215   1 2753 0            TCF     NXTIFAIL

 0409   REF   2 LAST 172     12,3216   0 3417 0  TEMPOK    TC      LAMPTEST          IF TEMP NOW OK, DONT TURN OFF LAMP IF
 0410   REF   2 LAST 173     12,3217   1 2753 0            TCF     NXTIFAIL          LAMP TEST IN PROGRESS.

 0411   REF   4 LAST 173     12,3220   4 7654 0            CS      BIT4
 0412                        12,3221   0 0006 1            EXTEND
 0413                        12,3222  03 011 1             WAND    11
 0414   REF   3 LAST 173     12,3223   1 2753 0            TCF     NXTIFAIL

 0415   REF   7 LAST 169     12,3224   3 7656 0  ITURNON   CAF     BIT2              IF DELAY REQUEST HAS GONE OFF
 0416   REF  22 LAST 173     12,3225   7 0367 1            MASK    IMODES30          PREMATURELY, DO NOT PROCESS ANY CHANGES
 0417   REF  83 LAST 172     12,3226  10 000 0             CCS     A                 UNTIL THE CURRENT 90 SEC WAIT EXPIRES.
 0418   REF   4 LAST 173     12,3227   1 2753 0            TCF     NXTIFAIL

 0419   REF  13 LAST 169     12,3230   3 7642 0            CAF     BIT14             SEE IF JUST ON OR OFF.
 0420   REF  23 LAST 173     12,3231   7 0367 1            MASK    IMODES30
 0421                        12,3232   0 0006 1            EXTEND
 0422   REF   1              12,3233   1 3247 1            BZF     ITURNON2          IF JUST ON.

 0423   REF  13 LAST 172     12,3234   3 7641 0            CAF     BIT15
 0424                        12,3235   0 0006 1            EXTEND                    SEE IF DELAY PRESENT DISCRETE HAS BEEN
 0425                        12,3236  02 012 0             RAND    12                SENT. IF SO, ACTION COMPLETE.
 0426                        12,3237   0 0006 1            EXTEND
 0427                        12,3240   1 3242 1            BZF     +2
 0428   REF   5 LAST 173     12,3241   1 2753 0            TCF     NXTIFAIL

 0429   REF   8 LAST 173     12,3242   3 7656 0            CAF     BIT2              IF NOT, SET BIT TO INDICATE REQUEST NOT
 0430   REF  24 LAST 173     12,3243  26 367 1             ADS     IMODES30          PRESENT FOR FULL DURATION.
 0431   REF   2 LAST 169     12,3244   0 5413 1            TC      ALARM
 0432                        12,3245    00207 1            OCT     207
 0433   REF   6 LAST 173     12,3246   1 2753 0            TCF     NXTIFAIL

 0434   REF   4 LAST 168     12,3247   4 7651 0  ITURNON2  CS      BIT7              SET BIT 7 TO INITIATE WAIT OF 1 SAMPLE.
 0435   REF  25 LAST 173     12,3250   7 0367 1            MASK    IMODES30
 0436   REF   5 LAST 173     12,3251   6 7651 1            AD      BIT7
 0437   REF  26 LAST 173     12,3252  54 367 1             TS      IMODES30
 0438   REF   7 LAST 173     12,3253   1 2753 0            TCF     NXTIFAIL
 L        T4RUPT PROGRAM                                                                     USER'S OWN PAGE NO.  15

  0439   REF  84 LAST 173     12,3254  10 000 0  IMUCAGE   CCS     A                  NO ACTION IF GOING OFF.
  0440   REF   8 LAST 173     12,3255  1 2753 0            TCF     NXTIFAIL

  0441   REF   1              12,3256  4 3433 1            CS      OCT71000           TERMINATE ICDU AND GYRO PULSE TRAINS.
  0442                        12,3257  0 0006 1            EXTEND
  0443                        12,3260  03 014 1            WAND    14

  0444   REF   2 LAST 169     12,3261  0 3373 0            TC      CAGESUB

  0445   REF  54 LAST 172     12,3262  3 7665 0            CAF     ZERO               ZERO COMMAND OUT-COUNTERS.
  0446   REF   1              12,3263  54 050 0            TS      CDUXCMD
  0447   REF   1              12,3264  54 051 1            TS      CDUYCMD
  0448   REF   1              12,3265  54 052 1            TS      CDUZCMD
  0449   REF   1              12,3266  54 047 0            TS      GYROCMD

  0450   REF   1              12,3267  4 3432 0            CS      OCT1700            HAVING WAITED AT LEAST 27 MCT FROM
  0451                        12,3270  0 0006 1            EXTEND                     GYRO PULSE TRAIN TERMINATION, WE CAN
  0452                        12,3271  03 014 1            WAND    14                 DE-SELECT THE GYROS.

  0453   REF   9 LAST 174     12,3272  1 2753 0            TCF     NXTIFAIL

  0454                        12,3273  0 0006 1  IMUOP     EXTEND
  0455   REF   1              12,3274  1 3304 1            BZF     IMUOP2

  0456   REF   9 LAST 170     12,3275  4 0061 1            CS      STATE              IF GOING OFF, ALARM IF PROG USING IMU.
  0457   REF   4 LAST 170     12,3276  7 7650 1            MASK    IMUSEFLG
  0458   REF  85 LAST 174     12,3277  10 000 0            CCS     A
  0459   REF  10 LAST 174     12,3300  1 2753 0            TCF     NXTIFAIL

  0460   REF   3 LAST 173     12,3301  0 5413 1            TC      ALARM
  0461                        12,3302   00214 0            OCT     214
  0462   REF  11 LAST 174     12,3303  1 2753 0            TCF     NXTIFAIL

  0463   REF   9 LAST 173     12,3304  3 7656 0  IMUOP2    CAF     BIT2               SEE IF FAILED ISS TURN-ON SEQ IN PROG.
  0464   REF  27 LAST 173     12,3305  7 0367 1            MASK    IMODES30
  0465   REF  86 LAST 174     12,3306  10 000 0            CCS     A
  0466   REF  12 LAST 174     12,3307  1 2753 0            TCF     NXTIFAIL           IF SO, DONT PROCESS UNTIL PRESENT 90
  0467   REF   2 LAST 173     12,3310  1 3247 1            TCF     ITURNON2           SECONDS EXPIRES.

  0468   REF  87 LAST 174     12,3311  10 000 0  PIPFAIL   CCS     A                  SET BIT10 IN IMODES30 SO ALL ISS WARNING
  0469   REF   6 LAST 151     12,3312  3 7646 1            CAF     BIT10              INFO IS IN ONE REGISTER.
  0470   REF  28 LAST 174     12,3313  56 367 0            XCH     IMODES30
  0471   REF   1              12,3314  7 3435 1            MASK    -BIT10
  0472   REF  29 LAST 174     12,3315  26 367 1            ADS     IMODES30

  0473   REF   2 LAST 170     12,3316  0 3344 1            TC      SETISSW

  0474   REF  30 LAST 174     12,3317  4 0367 1            CS      IMODES30           IF PIP FAIL DOESNT LIGHT ISS WARNING, DO
  0475   REF   3 LAST  76     12,3320  7 7657 0            MASK    BIT1               A PROGRAM ALARM IF IMU OPERATING BUT NOT
  0476   REF  88 LAST 174     12,3321  10 000 0            CCS     A                  CAGED OR BEING TURNED ON.
 0477   REF   1              12,3322  1 3141 1             TCF     NXTFL33

 0478   REF  31 LAST 174     12,3323  3 0367 0             CA      IMODES30
 0479   REF   1              12,3324  7 3431 0             MASK    OCT1720
 0480   REF  89 LAST 174     12,3325  10 000 0             CCS     A
 0481   REF   2 LAST 175     12,3326  1 3141 1             TCF     NXTFL33           ABOVE CONDITION NOT MET.

 0482   REF   4 LAST 174     12,3327  0 5413 1             TC      ALARM
 0483                        12,3330   00212 0             OCT     212
 0484   REF   3 LAST 175     12,3331  1 3141 1             TCF     NXTFL33

 0485   REF  90 LAST 175     12,3332  10 000 0  DNTMFAST   CCS     A                 DO PROG ALARM IF TM TOO FAST.
 0486   REF   4 LAST 175     12,3333  1 3141 1             TCF     NXTFL33

 0487   REF   5 LAST 175     12,3334  0 5413 1             TC      ALARM
 0488                        12,3335   01105 1             OCT     1105
 0489   REF   5 LAST 175     12,3336  1 3141 1             TCF     NXTFL33

 0490   REF  91 LAST 175     12,3337  10 000 0  UPTMFAST   CCS     A                 SAME AS DNLINK TOO FAST WITH DIFFERENT
 0491   REF   6 LAST 175     12,3340  1 3141 1             TCF     NXTFL33           ALARM CODE.

 0492   REF   6 LAST 175     12,3341  0 5413 1             TC      ALARM
 0493                        12,3342   01106 1             OCT     1106
 0494   REF   7 LAST 175     12,3343  1 3141 1             TCF     NXTFL33
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P0495              CLOSED SUBROUTINES FOR IMU MONITORING.

0496   REF    1               12,3344  3 3424 0  SETISSW  CAF     OCT15              SET ISS WARNING USING THE FAIL BITS IN
0497   REF   32 LAST 175      12,3345  7 0367 1           MASK    IMODES30           BITS 13, 12, AND 10 OF IMODES30 AND THE
0498                          12,3346  0 0006 1           EXTEND                     FAILURE INHIBIT BITS IN POSITIONS
0499   REF    7 LAST 174      12,3347  7 7646 0           MP      BIT10              4, 3, AND 1.
0500   REF   33 LAST 176      12,3350  3 0367 0           CA      IMODES30
0501                          12,3351  0 0006 1           EXTEND
0502   REF   33 LAST 171      12,3352  04 001 1           ROR     L                  0 INDICATES FAILURE.
0503                          12,3353  4 0000 0           COM
0504   REF    1               12,3354  7 4514 1           MASK    OCT15000
0505   REF   92 LAST 175      12,3355  10 000 0           CCS     A
0506   REF    1               12,3356  1 3367 1           TCF     ISSWON             FAILURE.

0507   REF    4 LAST 174      12,3357  3 7657 1  ISSWOFF  CAF     BIT1               DONT TURN OFF ISS WARNING IF LAMP TEST
0508   REF    6 LAST 171      12,3360  7 0370 1           MASK    IMODES33           IN PROGRESS.
0509   REF   93 LAST 176      12,3361  10 000 0           CCS     A
0510   REF  101 LAST 166      12,3362  0 0002 0           TC      Q

0511   REF    5 LAST 176      12,3363  4 7657 0           CS      BIT1
0512                          12,3364  0 0006 1           EXTEND
0513                          12,3365  03 011 1           WAND    11
0514   REF  102 LAST 176      12,3366  0 0002 0           TC      Q

0515   REF    6 LAST 176      12,3367  3 7657 1  ISSWON   CAF     BIT1
0516                          12,3370  0 0006 1           EXTEND
0517                          12,3371  05 011 1           WOR     11
0518   REF  103 LAST 176      12,3372  0 0002 0           TC      Q

0519   REF    1               12,3373  4 3434 0  CAGESUB  CS      BITS6&15           SET OUTBITS AND INTERNAL FLAGS FOR
0520                          12,3374  0 0006 1           EXTEND                     SYSTEM TURN-ON OR CAGE. DISABLE THE
0521                          12,3375  03 012 1           WAND    12                 ERROR COUNTER AND REMOVE IMU DELAY COMP.
0522   REF    2 LAST 170      12,3376  3 3425 1           CAF     BITS4&5            SEND ZERO AND COARSE.
0523                          12,3377  0 0006 1           EXTEND
0524                          12,3400  05 012 1           WOR     12

0525   REF    1               12,3401  4 3427 1  CAGESUB2 CS      OCT75              SET FLAGS TO INDICATE CAGING OR TURN-ON,
0526   REF   34 LAST 176      12,3402  7 0367 1           MASK    IMODES30           AND TO INHIBIT ALL ISS WARNING INFO.
0527   REF    2 LAST 176      12,3403  6 3427 0           AD      OCT75
0528   REF   35 LAST 176      12,3404  54 367 1           TS      IMODES30

0529   REF  104 LAST 176      12,3405  0 0002 0           TC      Q

0530   REF    3 LAST 174              12,3344  IMUFAIL  EQUALS  SETISSW
0531   REF    4 LAST 176              12,3344  ICDUFAIL EQUALS  SETISSW
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L         T4RUPT PROGRAM                                                                           USER'S OWN PAGE NO.  18

P0532                JUMP TABLES AND CONSTANTS.

 0533    REF    1                  12,3406   1 3224 1  IFAILJMP TCF      ITURNON           CHANNEL 30 DISPATCH.
 0534    REF    1                  12,3407   1 3344 0           TCF      IMUFAIL
 0535    REF    1                  12,3410   1 3344 0           TCF      ICDUFAIL
 0536    REF    1                  12,3411   1 3254 0           TCF      IMUCAGE
 0537                              12,3412    76400 1  30RDMSK  OCT      76400             (BIT 10 NOT SAMPLED HERE).
 0538    REF    1                  12,3413   1 3273 0           TCF      IMUOP

 0539    REF    1                  12,3414   1 3311 0  C33JMP   TCF      PIPFAIL           CHANNEL 33 DISPATCH.
 0540    REF    1                  12,3415   1 3332 1           TCF      DNTMFAST
 0541    REF    1                  12,3416   1 3337 1           TCF      UPTMFAST

R0542                SUBROUTINE TO SKIP IF LAMP TEST NOT IN PROGRESS.
 0543    REF    7 LAST 176         12,3417   4 0370 1  LAMPTEST CS       IMODES33          BIT 1 OF IMODES33 = 1 IF LAMP TEST IN
 0544    REF    7 LAST 176         12,3420   7 7657 0           MASK     BIT1              PROGRESS.
 0545    REF   94 LAST 176         12,3421  10 000 0            CCS      A
 0546    REF  105 LAST 176         12,3422  24 002 0            INCR     Q
 0547    REF  106 LAST 177         12,3423   0 0002 0           TC       Q

 0548    REF    1                               4515  33RDMSK  EQUALS   PRIO16
 0549                              12,3424    00015 0  OCT15    OCT      15
 0550                              12,3425    00030 1  BITS4&5  OCT      30
 0551                              12,3426    00054 0  OCT54    OCT      54
 0552                              12,3427    00075 0  OCT75    OCT      75
 0553                              12,3430    00300 1  BITS7&8  OCT      300
 0554                              12,3431    01720 0  OCT1720  OCT      1720
 0555                              12,3432    01700 1  OCT1700  OCT      1700
 0556    REF    1                               4514  OCT15000 EQUALS   PRIO15
 0557                              12,3433    71000 1  OCT71000 OCT      71000
 0558                              12,3434    40040 1  BITS6&15 OCT      40040
 0559                              12,3435    76777 1  -BIT10   OCT      -1000

 0560                              12,3436    21450 0  90SECS   DEC      9000
 0561                              12,3437    00014 1  120MS    DEC      12

 0562    REF    2 LAST 167                   12,3752  GLOCKOK  EQUALS   RCSMONIT
 0563    REF    5 LAST 172                   12,3752  NOIMUMON EQUALS   GLOCKOK
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L         T4RUPT PROGRAM                                                             USER'S OWN PAGE NO.  19

P0564            RR INBIT MONITOR.

 0565   REF   3 LAST 158       12,3440  3 0413 1  RRAUTCHK CA     RADMODES          SEE IF CHANGE IN RR AUTO MODE BIT.
 0566                          12,3441  0 0006 1           EXTEND
 0567                          12,3442  06 033 1           RXOR   33
 0568   REF  10 LAST 174       12,3443  7 7656 1           MASK   BIT2
 0569                          12,3444  0 0006 1           EXTEND
 0570   REF   1                12,3445  1 3501 1           BZF    RRCDUCHK

 0571   REF   4 LAST 178       12,3446  22 413 1           LXCH   RADMODES          UPDATE RADMODES.
 0572                          12,3447  0 0006 1           EXTEND
 0573   REF  34 LAST 176       12,3450  06 001 0           RXOR   L
 0574   REF   5 LAST 178       12,3451  54 413 0           TS     RADMODES
 0575   REF  11 LAST 178       12,3452  7 7656 1           MASK   BIT2              SEE IF JUST ON.
 0576   REF  95 LAST 177       12,3453  10 000 0           CCS    A
 0577   REF   1                12,3454  1 3473 0           TCF    RROFF             OFF.

 0578   REF   6 LAST 173       12,3455  3 7651 1           CAF    BIT7              IF JUST ON AND SOME PROGRAM IS USING THE
 0579   REF  10 LAST 174       12,3456  7 0061 1           MASK   STATE             RR, DONT ZERO THE CDUS.
 0580   REF  96 LAST 178       12,3457  10 000 0           CCS    A
 0581   REF   2 LAST 178       12,3460  1 3501 1           TCF    RRCDUCHK

 0582   REF   1                12,3461  4 3472 1           CS     OCT10001          SET BITS TO INDICATE ZERO AND TURNON
 0583   REF   6 LAST 178       12,3462  7 0413 0           MASK   RADMODES          IN PROGRESS.
 0584   REF   2 LAST 178       12,3463  6 3472 0           AD     OCT10001
 0585   REF   7 LAST 178       12,3464  54 413 0           TS     RADMODES

 0586   REF  31 LAST 171       12,3465  3 7657 1           CAF    ONE
 0587   REF   6 LAST 170       12,3466  0 4536 0           TC     WAITLIST
 0588                          12,3467   02000 0           2CADR  RRTURNON
C0588   REF   1                12,3470   20006 0
 0589   REF   1                12,3471  1 3545 1           TCF    NORRGMON

 0590                          12,3472   10001 1  OCT10001 OCT    10001

 0591   REF  11 LAST 178       12,3473  4 0061 1  RROFF    CS     STATE             IF SOMEONE WAS USING THE RR, DISPLAY AN
 0592   REF   7 LAST 178       12,3474  7 7651 0           MASK   BIT7              ALARM IF THE RR GOES OUT OF AUTO MODE.
 0593   REF  97 LAST 178       12,3475  10 000 0           CCS    A
 0594   REF   3 LAST 178       12,3476  1 3501 1           TCF    RRCDUCHK

 0595   REF   7 LAST 175       12,3477  0 5413 1           TC     ALARM
 0596                          12,3500   00514 1           OCT    514
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L        T4RUPT PROGRAM                                                                USER'S OWN PAGE NO.  20

P0597              CHECK FOR RR CDU FAIL.

 0598    REF    8 LAST 178     12,3501   3 0413 1  RRCDUCHK CA      RADMODES          LAST SAMPLED BIT IN RADMODES.
 0599                          12,3502   0 0006 1           EXTEND
 0600                          12,3503   06 030 1           RXOR    30
 0601    REF    8 LAST 178     12,3504   7 7651 0           MASK    BIT7
 0602                          12,3505   0 0006 1           EXTEND
 0603    REF    1              12,3506   1 3521 0           BZF     RRGIMON

 0604    REF   12 LAST 178     12,3507   3 7656 0           CAF     BIT2              IF RR NOT IN AUTO MODE, DONT CHANGE BIT
 0605    REF    9 LAST 179     12,3510   7 0413 0           MASK    RADMODES          7 OF RADMODES. IF THIS WERE NOT DONE,
 0606    REF   98 LAST 178     12,3511   10 000 0           CCS     A                 THE TRACKER FAIL MIGHT COME ON WHEN
 0607    REF    2 LAST 178     12,3512   1 3545 1           TCF     NORRGMON          JUST READING LR DATA.

 0608    REF    9 LAST 179     12,3513   3 7651 1           CAF     BIT7              SET BIT 7 OF RADMODES FOR SETTRKF.
 0609    REF   10 LAST 179     12,3514   22 413 1           LXCH    RADMODES          UPDATE RADMODES.
 0610                          12,3515   0 0006 1           EXTEND
 0611    REF   35 LAST 178     12,3516   06 001 0           RXOR    L
 0612    REF   11 LAST 179     12,3517   54 413 0           TS      RADMODES

 0613    REF    1              12,3520   0 5042 1  TRKFLCDU TC      SETTRKF           UPDATE TRACKER FAIL LAMP ON DSKY.
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L       T4RUPT PROGRAM                                                             USER'S OWN PAGE NO.  21

P0614        THE RR GIMBAL LIMIT MONITOR IS ENABLED WHENEVER THE RR IS IN THE AUTO MODE EXCEPT WHEN THE RR CDUS ARE
R0616   BEING ZEROED, OR DURING A REMODE OR MONITOR REPOSITION OPERATION. THE LATTER IS INITIATED BY THIS MONITOR WHEN
R0618   THE GIMBALS EXCEED THE LIMITS FOR THE CURRENT MODE. A ROUTINE IS INITIATED TO DRIVE THE GIMBALS TO T = 0 AND
R0620   S = 0 IF IN MODE 1 AND T = 180 WITH S = -90 FOR MODE 2.

 0621   REF   1                12,3521   3 3543 0  RRGIMON  CAF     OCT32002        INHIBITED BY REMODE, ZEROING, MONITOR,
 0622   REF  12 LAST 179       12,3522   7 0413 0           MASK    RADMODES        OR RR NOT IN AUTO.
 0623   REF  99 LAST 179       12,3523  10 000 0            CCS     A
 0624   REF   3 LAST 179       12,3524   1 3545 1           TCF     NORRGMON

 0625   REF   1                12,3525   0 4777 1           TC      RRLIMCHK        SEE IF ANGLES IN LIMITS.
 0626   REF   1                12,3526    00035 1           ADRES   OPTY

 0627   REF   1                12,3527   1 3531 1           TCF     MONREPOS

 0628   REF   4 LAST 180       12,3530   1 3545 1           TCF     NORRGMON        (ADDITIONAL CODING MAY GO HERE).

 0629   REF   6 LAST 170       12,3531   3 7645 1  MONREPOS CAF     BIT11           SET FLAG TO SHOW REPOSITION IN PROGRESS.
 0630   REF  13 LAST 180       12,3532  26 413 0            ADS     RADMODES

 0631   REF   1                12,3533   4 3544 0           CS      OCT20002        DISABLE TRACKER AND ERROR COUNTER.
 0632                          12,3534   0 0006 1           EXTEND
 0633                          12,3535  03 012 1            WAND    12

 0634   REF  14 LAST 137       12,3536   3 7656 0           CAF     TWO
 0635   REF   7 LAST 178       12,3537   0 4536 0           TC      WAITLIST
 0636                          12,3540    02051 1           2CADR   DORREPOS
C0636   REF   1                12,3541    20006 0
 0637   REF   5 LAST 180       12,3542   1 3545 1           TCF     NORRGMON

 0638                          12,3543    32002 1  OCT32002 OCT     32002
 0639                          12,3544    20002 1  OCT20002 OCT     20002
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L        T4RUPT PROGRAM                                                                   USER'S OWN PAGE NO.  22

P0640    PROGRAM NAME: GPMATRIX           MOD. NO. 0  DATE: OCTOBER 20, 1966

R0641    AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0642    THIS PROGRAM CALCULATES ALL THE SINGLE-PRECISION MATRIX ELEMENTS WHICH ARE USED BY LEM DAP TO TRANSFORM VECTORS
R0644    FROM GIMBAL TO PILOT (BODY) AXES AND BACK AGAIN.  THESE ELEMENTS ARE USED EXCLUSIVELY BY BASIC LANGUAGE ROUTINES
R0646    AND THEREFORE ARE NOT ARRAYED FOR USE BY INTERPRETIVE PROGRAMS.

R0647    CALLING SEQUENCE: GPMATRIX IS ALWAYS EXECUTED 4 TIMES A SECOND BY T4RUPT PROGRAM.  IT IS LISTED EXPLICITLY TWICE
R0649    IN THE T4JUMP TABLE, BUT IT ALSO OCCURS AFTER RRAUTCHK (TWICE).

R0650    SUBROUTINES CALLED: SPSIN, SPCOS.

R0651    NORMAL EXIT MODE: CONTROL IS ALWAYS TRANSFERRED TO DBSELECT.

R0652    ALARM/ABORT MODE: THERE ARE NO REAL ALARMS OR ABORTS.  HOWEVER, WHEN THE MIDDLE GIMBAL ANGLE NEARS GIMBAL LOCK,
R0654    A DIVISION BY COS(MG) WILL CAUSE OVERFLOW (I.E. A BAD QUOTIENT).  THIS CONDITION IS PREVENTED BY TESTING COS(MG)
R0656    AND SUBSTITUTING POSMAX/NEGMAX FOR THE INCALCULABLE QUANTITITIES.

R0657    INPUT: CDUX,CDUY,CDUZ.           OUTPUT: M11,M21,M31,M22,M32,MR12,MR13.
R0658                                             (ALSO MR22=M22,MR23=M32)         AM DOES NOT DETECT IT.

R0660    *** WARNING ** IT DIES ON DV OVERFLOW.

R0661    AOG = CDUX, AIG = CDUY, AMG = CDUZ: MNEMONIC IS: OIM = XYZ

R0662       *       *     SIN(MG)            0         1  *
R0663       M   =   *     COS(MG)COS(OG)  SIN(OG)      0  *
R0664        GP     *    -COS(MG)SIN(OG)  COS(OG)      0  *

R0665       *       *  0    COS(OG)/COS(MG)            -SIN(OG)/COS(MG)           *
R0666       M   =   *  0    SIN(OG)                     COS(OG)                   *
R0667        PG     *  1  -SIN(MG)COS(OG)/COS(MG)   SIN(MG)SIN(OG)/COS(MG)        *

  0668   REF   3 LAST 172      12,3545  30 034 0  GPMATRIX CAE     CDUZ              SINGLE ENTRY POINT
  0669   REF   1               12,3546   0 4233 1          TC      SPSIN             SIN(CDUZ) = SIN(MG)
  0670   REF   3 LAST 160      12,3547  55'404 1           TS      M11               SCALED AT 1

  0671   REF   4 LAST 181      12,3550  30 034 0           CAE     CDUZ
  0672   REF   1               12,3551   0 4232 0          TC      SPCOS             COS(CDUZ) = COS(MG)
  0673   REF   1               12,3552  55'466 0           TS      COSMG             SCALED AT 1 (ONLY A FACTOR)

  0674   REF   2 LAST 151      12,3553  30 032 0           CAE     CDUX
  0675   REF   2 LAST 181      12,3554   0 4233 1          TC      SPSIN             SIN(CDUX) = SIN(OG)
  0676   REF   1               12,3555  55'401 1           TS      M22               SCALED AT 1 (ALSO IS MR22)

  0677   REF   2 LAST 181      12,3556   4 1401 1          CS      M22
  0678                         12,3557   0 0006 1          EXTEND
  0679   REF   2 LAST 181      12,3560   7 1466 0          MP      COSMG             -SIN(OG)COS(MG)
  0680   REF   1               12,3561  55'406 0           TS      M31               SCALED AT 1
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L        T4RUPT PROGRAM                                                                     USER'S OWN PAGE NO. 23

 0681   REF    3 LAST 181     12,3562  30 032 0              CAE      CDUX
 0682   REF    2 LAST 181     12,3563  0 4232 0              TC       SPCOS             COS(CDUX) = COS(OG)
 0683   REF    1              12,3564  55'403 0              TS       M32               SCALED AT 1 (ALSO IS MR23)

 0684                         12,3565  0 0006 1              EXTEND
 0685   REF    3 LAST 181     12,3566  7 1466 0              MP       COSMG             COS(OG)COS(MG)
 0686   REF    1              12,3567  55'405 0              TS       M21               SCALED AT 1

 0687   REF    4 LAST 182     12,3570  31'466 1              CAE      COSMG             TEST FOR GIMBAL LOCK (OVERFLOW) REGION
 0688   REF    4 LAST 156     12,3571  6 7640 1              AD       NEG1/2            BY TESTING MIDDLE GIMBAL ANGLE FOR
 0689                         12,3572  0 0006 1              EXTEND                     VALUES EQUAL TO OR GREATER THAN 60 DEGS.
 0690   REF    1              12,3573  6 3610 0              BZMF     GPGLOCK

 0691   REF    2 LAST 182     12,3574  31'403 1              CAE      M32
 0692                         12,3575  0 0006 1              EXTEND
 0693   REF   14 LAST 173     12,3576  7 7642 1              MP       BIT14             SCALE FOR DIVISION
 0694                         12,3577  0 0006 1              EXTEND
 0695   REF    5 LAST 182     12,3600  11'466 0              DV       COSMG             COS(OG)/COS(MG)
 0696   REF    1              12,3601  55'400 0              TS       MR12              SCALED AT 2

 0697   REF    3 LAST 181     12,3602  4 1401 1              CS       M22
 0698                         12,3603  0 0006 1              EXTEND
 0699   REF   15 LAST 182     12,3604  7 7642 1              MP       BIT14             SCALE FOR DIVISION
 0700                         12,3605  0 0006 1              EXTEND
 0701   REF    6 LAST 182     12,3606  11'466 0              DV       COSMG             -SIN(OG)/COS(MG)
 0702   REF    1              12,3607  1 3621 0              TCF      MR13STOR

 0703   REF    3 LAST 182     12,3610  11'403 0    GPGLOCK   CCS      M32               SINCE DIVISION BY COS(MG) MIGHT CREATE
 0704   REF   16 LAST 173     12,3611  3 7637 1              CAF      POSMAX
 0705                         12,3612  1 3614 0              TCF       +2               OVERFLOW (I.E. A NUMBER GREATER THAN 2)
 0706   REF    2 LAST 141     12,3613  3 7641 0              CAF      NEGMAX
 0707   REF    2 LAST 182     12,3614  55'400 0              TS       MR12              USE THE VALUE SGN(NUMERATOR)*POSMAX AS

 0708   REF    4 LAST 182     12,3615  11'401 1              CCS      M22
 0709   REF   17 LAST 182     12,3616  3 7637 1              CAF      POSMAX            THE CLOSEST APPROXIMATION
 0710                         12,3617  1 3621 0              TCF       +2
 0711   REF    3 LAST 182     12,3620  3 7641 0              CAF      NEGMAX
 0712   REF    1              12,3621  55'402 1    MR13STOR  TS       MR13              SCALED AT 2
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P0713   THE FOLLOWING SECTION TESTS THE ATTITUDE HOLD BIT TO DETERMINE WHICH DEA
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L         T4RUPT PROGRAM                                                                   USER'S OWN PAGE NO.  25

P0714     PROGRAM NAME: DB SELECT          MOD. NO. 1  DATE: OCTOBER 24, 1966

R0715     AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0716     THIS PROGRAM SETS THE ERASABLE REGISTER DB TO ONE OF THE THREE VALUES:
R0717              1) 0.3 DEGREES IF IN ATTITUDE HOLD MODE OR IF IN AUTO WITH THE DEADBAND SELECT BIT OF DAPBOOLS SET
R0719                 TO MINIMUM.
R0720              2) 5.0 DEGREES IF IN AUTO WITH DEADBAND SELECT BIT SET TO MAXIMUM.
R0722              3) 1.0 DEGREES IF IN POWERED FLIGHT (ASCENT OR DESCENT) AND OVERRIDING ANY SETTITING OF SCSMODE OR THE
R0724                 DEADBAND SELECT BIT.  (*** SEE COMMENT AFTER CODING. ***)

R0725     ***** NOTICE *****

R0726     THE ABOVE CAPABILITY FULFILLS ALL THE KNOWN DEADBAND REQUIREMENTS FOR AS206, AS208B, AND AS278 (GIVEN THE
R0728     APPROPRIATE MISSION PROGRAMS).

R0729     (ALSO FOR MANNED FLIGHTS A DSKY ENTRY MUST BE SET UP TO SET THE DEADBAND SELECT BIT OF DAPBOOLS. - NOT DONE AS
R0731     OF 10/24/66.)

R0732     ***** DEADBAND SELECT BIT IS BIT13 OF DAPBOOLS. *****
R0733              0: MEANS MINIMUM DEADBAND
R0734              1: MEANS MAXIMUM DEADBAND

R0735     CALLING SEQUENCE: CONTROL FALLS THROUGH FROM GPMATRIX. (4 TIMES/SECOND)

R0736     SUBROUTINES CALLED: NONE.

R0737     NORMAL EXIT MODE: CONTROL IS ALWAYS TRANSFERRED TO UP/DOWN.

R0738     ALARM/ABORT MODE: NONE.

R0739     INPUT: BIT13/CHNL11,BIT13/CHNL31,BIT13/DAPBOOLS.  (SPOOKY, ISN'T IT?)

R0740     OUTPUT: DB (SCALED AT PI RADIANS).      (NO DEBRIS EXCEPT A)

 0741     REF    5 LAST 171      12,3622  3 7643 1  DBSELECT CAF     BIT13            ATTITUDE HOLD BIT OF CHANNEL 31
 0742                            12,3623  0 0006 1           EXTEND                   0 MEANS ATTITUDE HOLD
 0743                            12,3624  02 031 1           RAND    31               1 MEANS EITHER OFF OR AUTO
 0744                            12,3625  0 0006 1           EXTEND
 0745     REF    1               12,3626  1 3635 0           BZF     ATTHLDDB         (ATTITUDE HOLD BRANCH)

 0746     REF    2 LAST 151      12,3627  4 0765 1           CS      DAPBOOLS         DEADBAND SELECT BIT OF DAPBOOLS
 0747     REF    6 LAST 184      12,3630  7 7643 0           MASK    BIT13            0 MEANS MINIMUM DEADBAND
 0748     REF  100 LAST 180      12,3631  10 000 0           CCS     A                1 MEANS MAXIMUM DEADBAND
 0749     REF    2 LAST 184      12,3632  1 3635 0           TCF     ATTHLDDB         (MINIMUM DEADBAND BRANCH)

 0750     REF    1               12,3633  3 3747 0           CAF     DBMAXUM          SET MAXIMUM DEADBAND
 0751                            12,3634  1 3636 0           TCF      +2

 0752     REF    1               12,3635  3 3751 1  ATTHLDDB CAF     DBATTHLD         SET MINIMUM (ATTITUDE HOLD) DEADBAND
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L        T4RUPT PROGRAM                                                      USER'S OWN PAGE NO.  26

 0753    REF   1                12,3636  55'415 1           TS      DB

R0754    ***** IMPORTANT NOTICE *****

R0755    FOR EFFICIENCY, THE OVERRIDING 1 DEGREE DEADBAND DURING POWERED FLIGHT IS NOT TESTED FOR ABOVE.  THE PROGRAM
R0757    FOLLOWING (I.E. UP/DOWN) PERFORMS THIS FUNCTION AFTER THE APPROPRIATE TESTS.  THEREFORE, DB MAY TRANSIENTLY  BEP
R0759    INVALID, BUT THE DAP CANNOT USE IT THEN DUE TO T4RUPT MODE.
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L       T4RUPT PROGRAM                                                                          USER'S OWN PAGE NO.  27

P0760   PROGRAM NAME: UP/DOWN              MOD. NO. 1  DATE: OCTOBER 25, 1966

R0761   AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0762   THIS PROGRAM MONITORS THE STAGE OF THE LEM AND THE ENGINE ON BIT IN ORDER TO DETERMINE WHEN ASCENT, DESCENT, AND
R0764   COAST PHASES MUST BE SET UP FOR THE DAP.  (DONE 4 TIMES A SECOND.)

R0765   CALLING SEQUENCE: NONE.            SUBROUTINES CALLED: WAITLIST.

R0766   NORMAL EXIT MODE: CONTROL IS ALWAYS TRANSFERRED TO ENDDAPT4.

R0767   ALARM/ABORT MODE: NONE.

R0768   INPUT: BIT2/CHNL30,BIT13/CHNL11,BIT8/DAPBOOLS.

R0769   OUTPUT:  A) ASCENT COAST:
R0770                      1) BIT8/DAPBOOLS SET TO ZERO, MEANING COAST.
R0771                      2) MINIMPDB AND DBMINIMP SET TO 0.3 DEGREES.
R0772                B) ASCENT BURN:
R0773                      1) INITIALIZATION PASS:
R0774                              I) BIT8/DAPBOOLS SET FROM 0 TO 1, MEANING THAT THE AOSTASK HAS BEEN STARTED UP AND THAT
R0776                                 INITIALIZATION HAS OCCURRED.
R0777                             II) MINIMPDB SET TO -DB.
R0778                            III) DBMINIMP SET TO ZERO.
R0779                             IV) SUMRATEQ AND SUMRATER ZEROED FOR FIRST TWO SECOND AOSTASK SAMPLE PERIOD.
R0781                              V) KCOEFCTR ZEROED TO RECORD INITIAL TIME.
R0782                             VI) OMEGAQ AND OMEGAR RECORDED IN OLDWFORQ AND OLDWFORR AS LAST OMEGA VECTOR FOR AOSTASK.
R0784                            VII) AOSTASK SET IN WAITLIST FOR TWO SECONDS.
R0785                           VIII) DB SET TO DBAUTO.
R0786                             IX) ****** CHECKOUT ONLY **** IXXTASK, IYYTASK, AND IZZTASK SET IN WAITLIST FOR TEN MS.
R0788                      2) NORMAL PASS VOID.
R0789                C) DESCENT COAST:
R0790                      1) BIT2/DAPBOOLS SET TO 1, MEANING THAT TRIM GIMBAL CONTROL OF DESCENT IS IMPOSSIBLE SINCE
R0792                         DESCENT ENGINE OFF.
R0793                      2) AOSQTERM AND AOSRTERM ZEROED.
R0794                D) DESCENT BURN:
R0795                      1) DB SET TO DBAUTO.
R0796                      2) BIT2/DAPBOOLS CANNOT NOW BE ZEROED (EVEN THOUGH THE DESCENT ENGINE IS ON), SINCE IT IS NOT
R0798                         NECESSARILY TRUE THAT THIS IMPLIES AN OPERATIVE TRIM GIMBAL SYSTEM.

 0800   REF  13 LAST 179      12,3637   3 7656 0  UP/DOWN   CAF     BIT2                STAGE VERIFY BIT OF CHANNEL 30: INVERTED
 0801                         12,3640   0 0006 1            EXTEND                      0 MEANS ASCENT STAGE
 0802                         12,3641   02 030 0            RAND    30                  1 MEANS DESCENT STAGE
 0803   REF 101 LAST 184      12,3642   10 000 0            CCS     A
 0804   REF   1               12,3643   1 3725 0            TCF     DESCLEM             (DESCENT STAGE BRANCH)

 0805   REF   7 LAST 184      12,3644   3 7643 1  ASCLEM    CAF     BIT13               ENGINE ON BIT OF CHANNEL 11
 0806                         12,3645   0 0006 1            EXTEND                      0 MEANS OFF
 0807                         12,3646   02 011 0            RAND    11                  1 MEANS ON
 0808   REF 102 LAST 186      12,3647   10 000 0            CCS     A
 0809   REF    1            12,3650  1 3660 0            TCF    ASCDAP        (ASCENT BURN BRANCH)

 0810   REF    7 LAST 168   12,3651  4 7650 1  ASCCOAST  CS     BIT8          SET BIT8 OF DAPBOOLS TO COAST DAP LOGIC
 0811   REF    3 LAST 184   12,3652  7 0765 1            MASK   DAPBOOLS      LEM IS STAGED FOR ASCENT, BUT THE ASCENT
 0812   REF    4 LAST 187   12,3653  54 765 1            TS     DAPBOOLS      ENGINE IS NOT ON.

 0813   REF    2 LAST 184   12,3654  3 3751 1            CAF    DBATTHLD      FOR ASCENT COAST SET BOTH MINIMUM PULSE
 0814   REF    1            12,3655  55'647 1            TS     MINIMPDB      DEADBANDS TO THE DESCENT PHASE VALUE OF
 0815   REF    1            12,3656  55'646 0            TS     DBMINIMP      0.3 DEGREES SCALED AT PI RADIANS.

 0816   REF    1            12,3657  1 4606 1            TCF    ENDDAPT4      (END OF UP/DOWN)

 0817   REF    8 LAST 187   12,3660  3 7650 0  ASCDAP    CAF    BIT8          CHECK AOSTASK BIT OF DAPBOOLS
 0818   REF    5 LAST 187   12,3661  7 0765 1            MASK   DAPBOOLS      IF 0, SET BIT AND INITIATE WAITLIST TASK
 0819   REF  103 LAST 186   12,3662  10 000 0            CCS    A             IF 1, THEN TASK LOOP ALREADY BEGUN
 0820   REF    2 LAST 187   12,3663  1 4606 1            TCF    ENDDAPT4      (END OF UP/DOWN)

 0821   REF    1            12,3664  3 3750 0            CAF    DBAUTO        SINCE ASCENT ENGINE IS ON -
 0822   REF    2 LAST 185   12,3665  55'415 1            TS     DB            SET DEADBAND TO 1.0 DEGREES

 0823   REF    9 LAST 187   12,3666  3 7650 0            CAF    BIT8          SET BIT TO INDICATE AOSTASK SET UP AND
 0824   REF    6 LAST 187   12,3667  26 765 1            ADS    DAPBOOLS      ASCENT LOGIC.  BIT CLEARLY NOT SET YET.

 0825   REF    3 LAST 187   12,3670  4 1415 1            CS     DB            MODIFY THE TJETLAW FOR ASCENT:
 0826   REF    2 LAST 187   12,3671  55'647 1            TS     MINIMPDB      (IN ONE EQUATION DELETE MINIMPDB AND
 0827   REF   55 LAST 174   12,3672  3 7665 0            CAF    ZERO          SHIFT THE SWITCHING CURVE TO THE ORIGIN)
 0828   REF    2 LAST 187   12,3673  55'646 0            TS     DBMINIMP      MINIMPDB = -DB, DBMINIMP = 0

 0829   REF   56 LAST 187   12,3674  3 7665 0            CAF    ZERO          INITIALIZE SUM RATES
 0830   REF    1            12,3675  55'640 0            TS     SUMRATEQ
 0831   REF    1            12,3676  55'641 1            TS     SUMRATER
 0832   REF    1            12,3677  55'671 1            TS     KCOEFCTR      INITIALIZE TIME COUNTER
 0833   REF    1            12,3700  31'417 1            CAE    OMEGAQ        CREATE OLD OMEGAQ
 0834   REF    1            12,3701  55'644 1            TS     OLDWFORQ
 0835   REF    1            12,3702  31'421 1            CAE    OMEGAR        CREATE OLD OMEGAR
 0836   REF    1            12,3703  55'645 0            TS     OLDWFORR

R0837   ***** EVENTUALLY, USE 2SECWLT4 FROMM FIXED-FIXED AND NEW NAME. *****

 0838   REF    1            12,3704  3 3746 1            CAF    2SECWLT4      SET UP AOSTASK TO BEGIN IN 2 SECONDS
 0839   REF    8 LAST 180   12,3705  0 4536 0            TC     WAITLIST      IT THEN SETS UP A LOOP ON WAITLIST FOR
 0840                       12,3706   03064 0            2CADR  AOSTASK       2 SECOND INTERVALS AND CHECKS FOR THE
A0841   REF    1            12,3707   52006 0                                 SHUTDOWN CONDITION IN BIT8 OF DAPBOOLS

R0842   **********************************************************************************************************************

R0844   REMOVE THIS AND THE TASKS WHEN THE INERTIA ESTIMATOR WORKS.

 0845   REF   32 LAST 178   12,3710  3 7657 1            CAF    ONE           *** SPECIAL DAP CHECKOUT SEQUENCE ***
 0846   REF    9 LAST 187   12,3711  0 4536 0            TC     WAITLIST      THESE THREE CALLS TO WAITLIST BEGIN A
 0847                        12,3712   03525 0           2CADR  IXXTASK          COMPLICATED PROCEDURE TO DECREMENT THE
C0847   REF   1              12,3713   52006 0
 0848   REF  33 LAST 187     12,3714  3 7657 1           CAF    ONE              INERTIA MATRIX DIAGONAL ELEMENTS (EACH
 0849   REF  10 LAST 187     12,3715  0 4536 0           TC     WAITLIST         SCALED AT 2(+18) SLUG FEET(2) ) BY ONE
 0850                        12,3716   03536 1           2CADR  IYYTASK          BIT AS SOON AS APPROPRIATE BY A NOMINAL
C0850   REF   1              12,3717   52006 0
 0851   REF  34 LAST 188     12,3720  3 7657 1           CAF    ONE              LINEAR APPROXIMATION TO INERTIAL CHANGE.
 0852   REF  11 LAST 188     12,3721  0 4536 0           TC     WAITLIST
 0853                        12,3722   03547 1           2CADR  IZZTASK          *** NOT TO BE USED IN MISSIONS ***
C0853   REF   1              12,3723   52006 0
R0854   ****************************************************************************************************************************

 0856   REF   3 LAST 187     12,3724  1 4606 1           TCF    ENDDAPT4         (END OF UP/DOWN)

 0857   REF   8 LAST 186     12,3725  3 7643 1  DESCLEM  CAF    BIT13            ENGINE ON BIT OF CHANNEL 11
 0858                        12,3726  0 0006 1           EXTEND                  0 MEANS OFF
 0859                        12,3727  02 011 0           RAND   11               1 MEANS ON
 0860   REF 104 LAST 187     12,3730  10 000 0           CCS    A
 0861   REF   1              12,3731  1 3742 1           TCF    DESCDAP          (DESCENT BURN BRANCH)

 0862   REF  14 LAST 186     12,3732  4 7656 1  DESCOAST CS     BIT2             SET BIT2 OF DAPBOOLS TO INDICATE THAT
 0863   REF   7 LAST 187     12,3733  7 0765 1           MASK   DAPBOOLS         TRIM GIMBAL CANNOT BE USED SINCE THE
 0864   REF  15 LAST 188     12,3734  6 7656 0           AD     BIT2             STAGE IS DESCENT, BUT THE ENGINE IS NOT
 0865   REF   8 LAST 188     12,3735  54 765 1           TS     DAPBOOLS         ON.

 0866   REF  57 LAST 187     12,3736  3 7665 0           CAF    ZERO             ZERO TRIM GIMBAL OFFSET ACCELERATION
 0867   REF   1              12,3737  55'642 1           TS     AOSQTERM         TERMS IN THE DESCENT RATE DERIVATION
 0868   REF   1              12,3740  55'643 0           TS     AOSRTERM         SINCE THE THRUST IS ZERO (ENGINE OFF).

 0869   REF   4 LAST 188     12,3741  1 4606 1           TCF    ENDDAPT4         (END OF UP/DOWN)

 0870   REF   2 LAST 187     12,3742  3 3750 0  DESCDAP  CAF    DBAUTO           SINCE DESCENT ENGINE IS ON -
 0871   REF   4 LAST 187     12,3743  55'415 1           TS     DB               SET DEADBAND TO 1.0 DEGREES

 0872   REF   5 LAST 188     12,3744  1 4606 1           TCF    ENDDAPT4         (END OF UP/DOWN)

 0873   REF   6 LAST 188     12,3745  1 4606 1           TCF    ENDDAPT4



 0874                        12,3746   00310 0  2SECWLT4 DEC    200              2 SECONDS WAITLIST DT
 0875                        12,3747   00707 1  DBMAXUM  DEC    0.02778          5.0 DEGREES SCALED AT PI RADIANS
 0876                        12,3750   00133 0  DBAUTO   DEC    0.00555          1.0 DEGREES SCALED AT PI RADIANS
 0877                        12,3751   00033 1  DBATTHLD DEC    0.00167          0.3 DEGREES SCALED AT PI RADIANS


 0878   REF   3 LAST 164             12,3545  NORRGMON EQUALS GPMATRIX
 0879   REF   3 LAST  33                4606  ENDDAPT4 EQUALS RESUME
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L        IMU MODE SWITCHING ROUTINES                                                  USER'S OWN PAGE NO.   1

 0001    REF    1                         4755           SETLOC ENDT4FF
 0002    REF    1                           E3           EBANK= COMMAND

R0003             FIXED-FIXED ROUTINES.

 0004    REF  58 LAST 188         4755   3 7665 0  ZEROICDU CAF     ZERO             ZERO ICDU COUNTERS.
 0005    REF   4 LAST 182         4756  54 032 1           TS      CDUX
 0006    REF   2 LAST 151         4757  54 033 0           TS      CDUY
 0007    REF   5 LAST 181         4760  54 034 1           TS      CDUZ
 0008    REF 107 LAST 177         4761   0 0002 0           TC      Q

 0009                             4762   00454 1  3SECS    DEC     300

 0010                                         4763  ENDIMODF EQUALS
```

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L        IMU MODE SWITCHING ROUTINES                                                       USER'S OWN PAGE NO.   2

P0011              IMU ZEROING ROUTINE.

 0012                                     13,2000              BANK     13

 0013                          13,2000  0 0004 0  IMUZERO  INHINT             ROUTINE TO ZERO ICDUS.
 0014   REF   5 LAST 174       13,2001  4 7650 1           CS       IMUSEFLG  SET INDICATION THAT A MISSION OR TEST
 0015   REF  12 LAST 178       13,2002  7 0061 1           MASK     STATE     PROGRAM IS USING THE IMU.
 0016   REF   6 LAST 190       13,2003  6 7650 0           AD       IMUSEFLG
 0017   REF  13 LAST 190       13,2004  54 061 1           TS       STATE

 0018   REF   1                13,2005  0 2650 0           TC       CAGETSTQ  IF IMU COMING UP, TURN-ON PROGRAM WILL
 0019   REF   1                13,2006  1 2033 1           TCF      MODEEXIT  DO ALL THE WORK.

 0020   REF   1                13,2007  4 2743 1           CS       BITS3&4   INHIBIT ICDUFAIL AND IMUFAIL (IN CASE WE
 0021   REF  36 LAST 176       13,2010  7 0367 1           MASK     IMODES30  JUST CAME OUT OF COARSE ALIGN).
 0022   REF   2 LAST 190       13,2011  6 2743 0           AD       BITS3&4
 0023   REF  37 LAST 190       13,2012  54 367 1           TS       IMODES30

 0024   REF   1                13,2013  4 2744 0           CS       BITS4&6   SEND ZERO ENCODE WITH COARSE AND ERROR
 0025                          13,2014  0 0006 1           EXTEND             COUNTER DISABLED.
 0026                          13,2015  03 012 1           WAND     12

 0027   REF   3 LAST 170       13,2016  3 7653 0           CAF      BIT5
 0028                          13,2017  0 0006 1           EXTEND
 0029                          13,2020  05 012 1           WOR      12

 0030   REF  12 LAST 172       13,2021  3 7652 1           CAF      BIT6      WAIT 320 MS TO GIVE AGS ADEQUATE TIME TO
 0031   REF  12 LAST 188       13,2022  0 4536 0           TC       WAITLIST  RECEIVE ITS PULSE TRAIN.
 0032                          13,2023   02035 0           2CADR    IMUZERO2
C0032   REF   1                13,2024   26003 0
 0033   REF  38 LAST 190       13,2025  4 0367 1           CS       IMODES30  SEE IF IMU OPERATING AND ALARM IF NOT.
 0034   REF   4 LAST 169       13,2026  7 7647 1           MASK     BIT9
 0035   REF 105 LAST 188       13,2027  10 000 0           CCS      A
 0036   REF   2 LAST 190       13,2030  1 2033 1           TCF      MODEEXIT

 0037   REF   8 LAST 178       13,2031  0 5413 1           TC       ALARM
 0038                          13,2032   00210 1           OCT      210

 0039                          13,2033  0 0003 1  MODEEXIT RELINT             GENERAL MODE-SWITCHING EXIT.
 0040   REF   1                13,2034  1 4076 0           TCF      SWRETURN
 0041   REF    2 LAST 190     13,2035   0 2650 0  IMUZERO2 TC       CAGETSTQ       POSSIBLY SWITCH TO TURN-ON PROGRAM.
 0042   REF    8 LAST 170     13,2036   1 4602 0           TCF      TASKOVER

 0043   REF    2 LAST 170     13,2037   0 4755 1           TC       ZEROICDU       ZERO COUNTERS.
 0044   REF    4 LAST 190     13,2040   4 7653 1           CS       BIT5           REMOVE ZERO DISCRETE.
 0045                         13,2041   0 0006 1           EXTEND
 0046                         13,2042   03 012 1           WAND     12

 0047   REF    1              13,2043   3 4762 0           CAF      3SECSM         WAIT FOR COUNTERS TO SYNCRONIZE.
 0048   REF    3 LAST 170     13,2044   0 4557 1           TC       VARDELAY

 0049   REF    3 LAST 191     13,2045   0 2650 0  IMUZERO3 TC       CAGETSTQ
 0050   REF    9 LAST 191     13,2046   1 4602 0           TCF      TASKOVER

 0051   REF    3 LAST 190     13,2047   4 2743 1           CS       BITS3&4        REMOVE IMUFAIL AND ICDUFAIL INHIBIT.
 0052   REF   39 LAST 190     13,2050   7 0367 1           MASK     IMODES30
 0053   REF   40 LAST 191     13,2051   54 367 1           TS       IMODES30

 0054   REF    1              13,2052   0 4156 1           TC       IBNKCALL       SET ISS WARNING IF EITHER OF ABOVE ARE
 0055   REF    5 LAST 176     13,2053    25344 0           CADR     SETISSW        PRESENT.

 0056   REF    2 LAST 170     13,2054   1 2633 1           TCF      ENDIMU
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L       IMU MODE SWITCHING ROUTINES                                                        USER'S OWN PAGE NO.   4

P0057              IMU COARSE ALIGN MODE.

 0058   REF    5 LAST 173     13,2055  3 7654 1  IMUCOARS CAF     BIT4          SEND COARSE ALIGN ENABLE DISCRETE
 0059                         13,2056  0 0004 0           INHINT
 0060                         13,2057  0 0006 1           EXTEND
 0061   REF    1              13,2060  05 012 1           WOR     CHAN12

 0062   REF    6 LAST 192     13,2061  4 7654 0           CS      BIT4          INHIBIT IMU FAIL.
 0063   REF   41 LAST 191     13,2062  7 0367 1           MASK    IMODES30
 0064   REF    7 LAST 192     13,2063  6 7654 1           AD      BIT4
 0065   REF   42 LAST 192     13,2064  54 367 1           TS      IMODES30

 0066   REF    4 LAST 166     13,2065  3 6162 1           CAF     SIX
 0067   REF   13 LAST 190     13,2066  0 4536 0           TC      WAITLIST
 0068                         13,2067   02072 0           2CADR   COARS
C0068   REF    1              13,2070   26003 0
 0069   REF    3 LAST 190     13,2071  1 2033 1           TCF     MODEEXIT

 0070   REF    1              13,2072  0 2643 1  COARS    TC      CAGETEST
 0071   REF   13 LAST 190     13,2073  3 7652 1           CAF     BIT6          ENABLE ALL THREE ISS CDU ERROR COUNTERS
 0072                         13,2074  0 0006 1           EXTEND
 0073   REF    2 LAST 192     13,2075  05 012 1           WOR     CHAN12

 0074   REF   15 LAST 180     13,2076  3 7656 0           CAF     TWO           SET CDU INDICATOR
 0075   REF    1              13,2077  55'454 1  COARS1   TS      CDUIND

 0076   REF    2 LAST 192     13,2100  51'454 0           INDEX   CDUIND        COMPUTE THETAD - THETAA IN 1:S
 0077   REF    1              13,2101  3 0400 0           CA      THETAD          COMPLEMENT FORM
 0078                         13,2102  0 0006 1           EXTEND
 0079   REF    3 LAST 192     13,2103  5 1454 0           INDEX   CDUIND
 0080   REF    5 LAST 189     13,2104  20 032 1           MSU     CDUX
 0081                         13,2105  0 0006 1           EXTEND
 0082   REF    9 LAST 188     13,2106  7 7643 0           MP      BIT13         SHIFT RIGHT 2
 0083   REF   36 LAST 179     13,2107  56 001 0           XCH     L             ROUND
 0084                         13,2110  6 0000 1           DOUBLE
 0085   REF    3 LAST   9     13,2111  54 065 0           TS      ITEMP1
 0086                         13,2112  1 2114 0           TCF     +2
 0087   REF   37 LAST 192     13,2113  26 001 1           ADS     L

 0088   REF    4 LAST 192     13,2114  51'454 0           INDEX   CDUIND        DIFFERENCE TO BE COMPUTED
 0089   REF    2 LAST 189     13,2115  23'451 0           LXCH    COMMAND
 0090   REF    5 LAST 192     13,2116  11'454 1           CCS     CDUIND
 0091   REF    1              13,2117  0 2077 0           TC      COARS1

 0092   REF   16 LAST 192     13,2120  3 7656 0           CAF     TWO           MINIMUM OF 4 MS WAIT
 0093   REF    4 LAST 191     13,2121  0 4557 1           TC      VARDELAY
 0094   REF    2 LAST 192      13,2122  0 2643 1  COARS2   TC      CAGETEST          DONT CONTINUE IF CAGED.
 0095   REF    4 LAST 192      13,2123  54 065 0           TS      ITEMP1            SETS TO +0.
 0096   REF   17 LAST 192      13,2124  3 7656 0           CAF     TWO               SET CDU INDICATOR
 0097   REF    6 LAST 192      13,2125  55'454 1   +3      TS      CDUIND

 0098   REF    7 LAST 193      13,2126  51'454 0           INDEX   CDUIND
 0099   REF    3 LAST 192      13,2127  11'451 1           CCS     COMMAND           NUMBER OF PULSES REQUIRED
 0100   REF    1               13,2130  0 2134 0           TC      COMPOS            GREATER THAN MAX ALLOWED
 0101   REF    1               13,2131  0 2143 0           TC      NEXTCDU +1
 0102   REF    1               13,2132  0 2206 1           TC      COMNEG
 0103   REF    2 LAST 193      13,2133  0 2143 0           TC      NEXTCDU +1

 0104   REF    1               13,2134  6 2747 1  COMPOS   AD      -COMMAX           COMMAX = MAX NUMBER OF PULSES ALLOWED
 0105                          13,2135  0 0006 1           EXTEND                      MINUS ONE
 0106   REF    1               13,2136  6 2216 0           BZMF    COMZERO
 0107   REF    8 LAST 193      13,2137  51'454 0           INDEX   CDUIND
 0108   REF    4 LAST 193      13,2140  55'451 1           TS      COMMAND           REDUCE COMMAND BY MAX NUMBER OF PULSES
 0109   REF    1               13,2141  4 2750 0           CS      -COMMAX-            ALLOWED

 0110   REF    5 LAST 193      13,2142  24 065 1  NEXTCDU  INCR    ITEMP1
 0111   REF    9 LAST 193      13,2143  51'454 0           INDEX   CDUIND
 0112   REF    2 LAST 174      13,2144  54 050 0           TS      CDUXCMD           SET UP COMMAND REGISTER.

 0113   REF   10 LAST 193      13,2145  11'454 1           CCS     CDUIND
 0114   REF    1               13,2146  0 2125 0           TC      COARS2 +3

 0115   REF    6 LAST 193      13,2147  10 065 0           CCS     ITEMP1            SEE IF ANY PULSES TO GO OUT.
 0116   REF    1               13,2150  1 2222 0           TCF     SENDPULS

 0117   REF    1               13,2151  0 4554 1           TC      FIXDELAY          WAIT FOR GIMBALS TO SETTLE.
 0118                          13,2152   00226 1           DEC     150
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0119   REF  18 LAST 193     13,2153  3 7656 0            CAF     TWO              AT END OF COMMAND, CHECK TO SEE THAT
0120   REF   7 LAST 193     13,2154  54 065 0  CHKCORS   TS      ITEMP1           GIMBALS ARE WITHIN 2 DEGREES OF THETAD.
0121   REF 106 LAST 190     13,2155  50 000 1            INDEX   A
0122   REF   6 LAST 192     13,2156  3 0032 0            CA      CDUX
0123                        13,2157  0 0006 1            EXTEND
0124   REF   8 LAST 194     13,2160  5 0065 1            INDEX   ITEMP1
0125   REF   2 LAST 192     13,2161  20 400 1            MSU     THETAD
0126   REF 107 LAST 194     13,2162  10 000 0            CCS     A
0127   REF   1              13,2163  1 2177 0            TCF     COARSERR
0128   REF   1              13,2164  1 2166 0            TCF     CORSCHK2
0129   REF   2 LAST 194     13,2165  1 2177 0            TCF     COARSERR

0130   REF   9 LAST 194     13,2166  10 065 0  CORSCHK2  CCS     ITEMP1
0131   REF   1              13,2167  1 2154 1            TCF     CHKCORS
0132   REF   3 LAST  19     13,2170  55'451 1            TS      GCOMP            ZERO GYRO COMPENSATION REGISTERS IN
0133   REF   4 LAST 194     13,2171  55'452 1            TS      GCOMP +1         PREPARATION FOR COMPENSATION.
0134   REF   5 LAST 194     13,2172  55'453 0            TS      GCOMP +2
0135   REF   6 LAST 194     13,2173  55'454 1            TS      GCOMP +3
0136   REF   7 LAST 194     13,2174  55'455 0            TS      GCOMP +4
0137   REF   8 LAST 194     13,2175  55'456 0            TS      GCOMP +5

0138   REF   3 LAST 191     13,2176  1 2633 1            TCF     ENDIMU           END OF COARSE ALIGNMENT.

0139   REF   1              13,2177  6 2205 1  COARSERR  AD      COARSTOL         2 DEGREES.
0140                        13,2200  0 0006 1            EXTEND
0141   REF   2 LAST 194     13,2201  6 2166 1            BZMF    CORSCHK2

0142   REF   9 LAST 190     13,2202  0 5413 1            TC      ALARM            COARSE ALIGN ERROR.
0143                        13,2203   00211 0            OCT     211

0144   REF   2 LAST 169     13,2204  1 2641 1            TCF     IMUBAD

0145                        13,2205   77511 1  COARSTOL  DEC     -.01111          2 DEGREES SCALED AT HALF-REVOLUTIONS.
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L        IMU MODE SWITCHING ROUTINES                                                   USER'S OWN PAGE NO.   7

 0146    REF   2 LAST 193      13,2206  6 2747 1  COMNEG    AD      -COMMAX
 0147                          13,2207  0 0006 1            EXTEND
 0148    REF   2 LAST 193      13,2210  6 2216 0            BZMF    COMZERO
 0149                          13,2211  4 0000 0            COM
 0150    REF  11 LAST 193      13,2212  51'454 0            INDEX   CDUIND
 0151    REF   5 LAST 193      13,2213  55'451 1            TS      COMMAND
 0152    REF   2 LAST 193      13,2214  3 2750 1            CA      -COMMAX-
 0153    REF   3 LAST 193      13,2215  0 2142 1            TC      NEXTCDU

 0154    REF  59 LAST 189      13,2216  3 7665 0  COMZERO   CAF     ZERO
 0155    REF  12 LAST 195      13,2217  51'454 0            INDEX   CDUIND
 0156    REF   6 LAST 195      13,2220  57'451 0            XCH     COMMAND
 0157    REF   4 LAST 195      13,2221  0 2142 1            TC      NEXTCDU

 0158    REF   1               13,2222  3 2746 0  SENDPULS  CAF     13,14,15
 0159                          13,2223  0 0006 1            EXTEND
 0160    REF   1               13,2224  05 014 1            WOR     CHAN14
 0161    REF   1               13,2225  3 2751 0            CAF     600MS
 0162    REF   2 LAST 193      13,2226  1 2121 0            TCF     COARS2 -1          AND THEN TO VARDELAY.
```

```
L       IMU MODE SWITCHING ROUTINES                                              USER'S OWN PAGE NO.   8

P0163               IMU FINE ALIGN MODE SWITCH.

 0164                           13,2227  0 0004 0  IMUFINE  INHINT
 0165   REF   1                 13,2230  0 2655 0           TC      CAGETSTJ        SEE IF IMU BEING CAGED.

 0166   REF   1                 13,2231  4 2745 1           CS      BITS4-6         RESET ZERO, COARSE, AND ECTR ENABLE.
 0167                           13,2232  0 0006 1           EXTEND
 0168                           13,2233  03 012 1           WAND    12

 0169   REF   8 LAST 176        13,2234  3 7646 1           CAF     BIT10           IMU FAIL WAS INHIBITED DURING THE
 0170   REF  14 LAST 192        13,2235  0 4536 0           TC      WAITLIST        PRESUMABLY PRECEDING COARSE ALIGN. LEAVE
 0171                           13,2236   02247 1           2CADR   IFAILOK         IT ON FOR THE FIRST 5 SECS OF FINE ALIGN
C0171   REF   2 LAST 151        13,2237   26003 0
 0172   REF   1                 13,2240  3 2752 0           CAF     90SEC           GYRO RE-CENTERING TIME.
 0173   REF  15 LAST 196        13,2241  0 4536 0           TC      WAITLIST
 0174                           13,2242   02245 0           2CADR   IMUFINED
C0174   REF   1                 13,2243   26003 0
 0175   REF   4 LAST 192        13,2244  1 2033 1           TCF     MODEEXIT

 0176   REF   3 LAST 193        13,2245  0 2643 1  IMUFINED TC      CAGETEST        SEE THAT NO ONE HAS CAGED THE IMU.
 0177   REF   4 LAST 194        13,2246  1 2633 1           TCF     ENDIMU

 0178   REF   4 LAST 191        13,2247  0 2650 0  IFAILOK  TC      CAGETSTQ        ENABLE IMU FIAL UNLESS IMU BEING CAGED.
 0179   REF  10 LAST 191        13,2250  1 4602 0           TCF     TASKOVER        IT IS.

 0180   REF   8 LAST 192        13,2251  3 7654 1           CAF     BIT4            DONT RESET IMU FAIL INHIBIT IF SOMEONE
 0181                           13,2252  0 0006 1           EXTEND                  HAS GONE INTO COARSE ALIGN.
 0182                           13,2253  02 012 0           RAND    12
 0183   REF 108 LAST 194        13,2254  10 000 0           CCS     A
 0184   REF  11 LAST 196        13,2255  1 4602 0           TCF     TASKOVER

 0185   REF   9 LAST 196        13,2256  4 7654 0           CS      BIT4
 0186   REF  43 LAST 192        13,2257  7 0367 1  PFAILOK2 MASK    IMODES30
 0187   REF  44 LAST 196        13,2260  54 367 1           TS      IMODES30
 0188   REF  12 LAST 196        13,2261  1 4602 0           TCF     TASKOVER

 0189   REF   5 LAST 196        13,2262  0 2650 0  PFAILOK  TC      CAGETSTQ        ENABLE PIP FAIL PROG ALARM.
 0190   REF  13 LAST 196        13,2263  1 4602 0           TCF     TASKOVER

 0191   REF   5 LAST 191        13,2264  4 7653 1           CS      BIT5
 0192   REF   1                 13,2265  1 2257 1           TCF     PFAILOK2
```

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P0193              ROUITNES TO INITIATE AND TERMINATE PROGRAM USE OF THE PIPAS. NO IMUSTALL REQUIRED IN EITHER CASE.

 0195   REF    6 LAST 196      13,2266  0 2650 0  PIPUSE    TC      CAGETSTQ          DONT ENABLE PIPA FAIL IF IMU BEING CAGED
 0196   REF    2 LAST 190      13,2267  1 4076 0            TCF     SWRETURN

 0197                          13,2270  0 0004 0            INHINT
 0198   REF   60 LAST 195      13,2271  3 7665 0            CAF     ZERO              ZERO COUNTERS.
 0199   REF    1               13,2272  54 037 1            TS      PIPAX
 0200   REF    1               13,2273  54 040 1            TS      PIPAY
 0201   REF    1               13,2274  54 041 0            TS      PIPAZ

 0202   REF    8 LAST 177      13,2275  4 7657 0            CS      BIT1              IF PIPA FAILS FROM NOW ON (UNTIL
 0203   REF   45 LAST 196      13,2276  7 0367 1            MASK    IMODES30          PIPFREE), LIGHT ISS WARNING.
 0204   REF   46 LAST 197      13,2277  54 367 1            TS      IMODES30

 0205   REF    2 LAST 191      13,2300  0 4156 1  PIPFREE2  TC      IBNKCALL          ISS WARNING MIGHT COME ON NOW.
 0206   REF    6 LAST 191      13,2301    25344 0           CADR    SETISSW           (OR GO OFF ON PIPFREE).

 0207   REF    5 LAST 196      13,2302  1 2033 1            TCF     MODEEXIT

 0208                          13,2303  0 0004 0  PIPFREE   INHINT                    PROGRAM DONE WITH PIPAS. DONT LIGHT
 0209   REF    9 LAST 197      13,2304  4 7657 0            CS      BIT1              ISS WARNING.
 0210   REF   47 LAST 197      13,2305  7 0367 1            MASK    IMODES30
 0211   REF   10 LAST 197      13,2306  6 7657 1            AD      BIT1
 0212   REF   48 LAST 197      13,2307  54 367 1            TS      IMODES30

 0213   REF    9 LAST 196      13,2310  7 7646 0            MASK    BIT10             IF PIP FAIL ON, DO PROG ALSRM AND RESET
 0214   REF  109 LAST 196      13,2311  10 000 0            CCS     A                 ISS WARNING.
 0215   REF    6 LAST 197      13,2312  1 2033 1            TCF     MODEEXIT

 0216   REF   10 LAST 194      13,2313  0 5413 1            TC      ALARM
 0217                          13,2314    00212 0           OCT     212

 0218                          13,2315  0 0004 0            INHINT

 0219   REF    1               13,2316  1 2300 1            TCF     PIPFREE2
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P0220           THE FOLLOWING ROUTINE TORQUES THE IRIGS ACCORDING TO DOUBLE PRECISION INPUTS IN THE SIX REGISTERS
R0222    BEGINNING AT THE ECADR ARRIVING IN A. THE MINIMUM SIZE OF ANY PULSE TRAIN IS 16 PULSES (.25 CDU COUNTS). THE
R0224    UNSENT PORTION OF THE COMMAND IS LEFT INTACT IN THE INPUT COMMAND REGISTERS.

 0226                                       E3             EBANK= 1400             VARIABLE, ACTUALLY.

 0227    REF 370 LAST 157      13,2317  54 145 0  IMUPULSE TS      MPAC +5         SAVE ARRIVING ECADR.
 0228    REF   2 LAST 196      13,2320  0 2655 0           TC      CAGETSTJ        DONT PROCEED IF IMU BEING CAGED.

 0229    REF   2 LAST 158      13,2321  10 357 1           CCS     LGYRO           SEE IF GYROS BUSY.
 0230    REF   1               13,2322  0 2364 1           TC      GYROBUSY        SLEEP.

 0231    REF 371 LAST 198      13,2323  54 142 1           TS      MPAC +2
 0232    REF  14 LAST 192      13,2324  3 7652 1           CAF     BIT6            ENABLE THE POWER SUPPLY.
 0233                          13,2325  0 0006 1           EXTEND
 0234                          13,2326  05 014 1           WOR     14

 0235    REF   3 LAST 106      13,2327  3 7655 0           CAF     FOUR
 0236                          13,2330  0 0004 0  GWAKE2   INHINT                  (IF A JOB WAS PUT TO SLEEP, THE POWER
 0237    REF  16 LAST 196      13,2331  0 4536 0           TC      WAITLIST        SUPPLY IS LEFT ON BY THE WAKING JOB).
 0238                          13,2332   02402 0           2CADR   STRTGYRO
C0238    REF   1               13,2333   26003 0
 0239    REF 372 LAST 198      13,2334  3 0145 1           CA      MPAC +5         SET UP EBANK, SAVING CALLER'S EBANK FOR
 0240    REF   3 LAST 158      13,2335  56 003 1           XCH     EBANK           RESTORATION ON RETURN.
 0241    REF 373 LAST 198      13,2336  56 145 1           XCH     MPAC +5
 0242    REF   3 LAST 198      13,2337  54 357 1           TS      LGYRO           RESERVES GYROS.
 0243    REF   1               13,2340  7 5235 1           MASK    LOW8
 0244    REF  10 LAST 194      13,2341  54 065 0           TS      ITEMP1

 0245    REF  19 LAST 194      13,2342  3 7656 0           CAF     TWO             FORCE SIGN AGREEMENT ON INPUTS.
 0246    REF 374 LAST 198      13,2343  54 143 0  GYROAGRE TS      MPAC +3
 0247                          13,2344  6 0000 1           DOUBLE
 0248    REF  11 LAST 198      13,2345  6 0065 1           AD      ITEMP1
 0249    REF 375 LAST 198      13,2346  54 144 1           TS      MPAC +4
 0250                          13,2347  0 0006 1           EXTEND
 0251    REF 110 LAST 197      13,2350  5 0000 1           INDEX   A
 0252                          13,2351  3 1401 0           DCA     1400
 0253    REF 376 LAST 198      13,2352  52 141 1           DXCH    MPAC
 0254    REF   1               13,2353  0 7235 1           TC      TPAGREE
 0255    REF 377 LAST 198      13,2354  52 141 1           DXCH    MPAC
 0256    REF 378 LAST 198      13,2355  50 144 0           INDEX   MPAC +4
 0257                          13,2356  53 401 1           DXCH    1400

 0258    REF 379 LAST 198      13,2357  10 143 0           CCS     MPAC +3
 0259    REF   1               13,2360  1 2343 0           TCF     GYROAGRE

 0260    REF 380 LAST 198      13,2361  3 0145 1           CA      MPAC +5         RESTORE CALLER'S EBANK.
 0261    REF   4 LAST 198      13,2362  54 003 0           TS      EBANK
 0262    REF   7 LAST 197      13,2363  1 2033 1           TCF     MODEEXIT
```

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L        IMU MODE SWITCHING ROUTINES                                                    USER'S OWN PAGE NO.  11

P0263              ROUTINES TO ALLOW TORQUING BY ONLY ONE JOB AT A TIME.

 0264                             13,2364  0 0006 1  GYROBUSY EXTEND                  SAVE RETURN 2FCADR.
 0265    REF  19 LAST 114         13,2365  3 0120 1           DCA     BUF2
 0266    REF 381 LAST 198         13,2366  52 141 1           DXCH    MPAC
 0267    REF   1                  13,2367  3 2401 0  REGSLEEP CAF     LGWAKE
 0268    REF   1                  13,2370  1 4416 1           TCF     JOBSLEEP

 0269    REF   4 LAST 198         13,2371  10 357 1  GWAKE    CCS     LGYRO           WHEN AWAKENED, SEE IF GYROS STILL BUSY.
 0270    REF   1                  13,2372  1 2367 0           TCF     REGSLEEP        IF SO, SLEEP SOME MORE.

 0271    REF 382 LAST 199         13,2373  54 142 1           TS      MPAC +2
 0272                             13,2374  0 0006 1           EXTEND
 0273    REF 383 LAST 199         13,2375  3 0141 0           DCA     MPAC
 0274    REF  20 LAST 199         13,2376  52 120 0           DXCH    BUF2            RESTORE SWRETURN INFO.
 0275    REF  35 LAST 188         13,2377  3 7657 1           CAF     ONE
 0276    REF   1                  13,2400  1 2330 1           TCF     GWAKE2

 0277    REF   1                  13,2401   26371 0  LGWAKE   CADR    GWAKE
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L      IMU MODE SWITCHING ROUTINES                                             USER'S OWN PAGE NO.  12

P0278              GYRO-TORQUING WAITLIST TASKS.

 0279   REF   1                 13,2402  4 2630 1  STRTGYRO CS      GDESELCT          DE-SELECT LAST GYRO.
 0280                           13,2403  0 0006 1           EXTEND
 0281                           13,2404  03 014 1           WAND    14

 0282   REF   4 LAST 196        13,2405  0 2643 1           TC      CAGETEST

 0283   REF   5 LAST 199        13,2406  3 0357 0  STRTGYR2 CA      LGYRO             JUMP ON PHASE COUNTER IN BITS 13-14.
 0284                           13,2407  0 0006 1           EXTEND
 0285   REF  10 LAST 196        13,2410  7 7654 0           MP      BIT4
 0286   REF 111 LAST 198        13,2411  50 000 1           INDEX   A
 0287                           13,2412  1 2413 1           TCF     +1
 0288   REF   1                 13,2413  0 2442 1           TC      GSELECT           =0. DO Y GYRO.
 0289                           13,2414   00202 1           OCT     00202

 0290   REF   2 LAST 200        13,2415  0 2442 1           TC      GSELECT           =1. DO Z GYRO.
 0291                           13,2416   00302 0           OCT     00302

 0292   REF   3 LAST 200        13,2417  0 2440 0           TC      GSELECT -2        =2. DO X GYRO.
 0293                           13,2420   00100 0           OCT     00100

 0294   REF  61 LAST 197        13,2421  3 7665 0           CAF     ZERO              =3. DONE
 0295   REF   6 LAST 200        13,2422  54 357 1           TS      LGYRO
 0296   REF   2 LAST 199        13,2423  3 2401 0           CAF     LGWAKE            WAKE A POSSIBLE SLEEPING JOB.
 0297   REF   1                 13,2424  0 4422 1           TC      JOBWAKE

 0298   REF  16 LAST 188        13,2425  3 7656 0           CAF     BIT2              DONT RESET POWER SUPPLY IF BIT SET
 0299   REF   8 LAST 177        13,2426  7 0370 1           MASK    IMODES33          (ONLY DURING GYRO TORQUE SCALE FACTOR
 0300   REF 112 LAST 200        13,2427  10 000 0           CCS     A                 TEST).
 0301   REF   1                 13,2430  1 2437 1           TCF     NORESET

 0302   REF  18 LAST 133        13,2431  10 071 0           CCS     LOCCTR            IF A JOB WAS AWAKENED, DONT RESET GYRO
 0303   REF   2 LAST 200        13,2432  1 2437 1           TCF     NORESET           ENABLE.

 0304   REF   3 LAST 200        13,2433  1 2437 1           TCF     NORESET

 0305   REF  15 LAST 198        13,2434  4 7652 0           CS      BIT6              IF NO JOB AWAKENED, RESET GYRO ENABLE.
 0306                           13,2435  0 0006 1           EXTEND
 0307                           13,2436  03 014 1           WAND    14

 0308   REF   2 LAST 196        13,2437  1 2245 1  NORESET  TCF     IMUFINED
```

```
L          IMU MODE SWITCHING ROUTINES                                                            USER'S OWN PAGE NO.  13

 0309   REF   4 LAST 198      13,2440  4 7655 1    -2         CS       FOUR                  SPECIAL ENTRY TO REGRESS LGYRO FOR X.
 0310   REF   7 LAST 200      13,2441  26 357 1               ADS      LGYRO

 0311   REF 108 LAST 189      13,2442  50 002 0  GSELECT      INDEX    Q                     SELECT GYRO.
 0312                         13,2443  3 0000 1               CAF      0                     PACKED WORD CONTAINS GYRO SELECT BITS
 0313   REF   3 LAST   9      13,2444  54 071 0               TS       ITEMP4                AND INCREMENT TO LGYRO.
 0314   REF   5 LAST 160      13,2445  7 7663 1               MASK     SEVEN
 0315   REF  10 LAST 192      13,2446  6 7643 1               AD       BIT13
 0316   REF   8 LAST 201      13,2447  26 357 1               ADS      LGYRO
 0317   REF   5 LAST 198      13,2450  54 003 0               TS       EBANK
 0318   REF   2 LAST 198      13,2451  7 5235 1               MASK     LOW8
 0319   REF  12 LAST 198      13,2452  54 065 0               TS       ITEMP1

 0320   REF   6 LAST 201      13,2453  4 7663 1               CS       SEVEN
 0321   REF   4 LAST 201      13,2454  7 0071 0               MASK     ITEMP4
 0322   REF   5 LAST 201      13,2455  54 071 0               TS       ITEMP4

 0323                         13,2456  0 0006 1               EXTEND                         MOVE DP COMMAND TO RUPTREGS FOR TESTING.
 0324   REF  13 LAST 201      13,2457  5 0065 1               INDEX    ITEMP1
 0325                         13,2460  3 1401 0               DCA      1400
 0326   REF  13 LAST 171      13,2461  52 075 1               DXCH     RUPTREG1

 0327   REF  14 LAST 201      13,2462  10 074 0               CCS      RUPTREG1
 0328   REF   1               13,2463  1 2476 1               TCF      MAJ+
 0329                         13,2464  1 2466 0               TCF      +2
 0330   REF   1               13,2465  1 2611 1               TCF      MAJ-

 0331   REF   7 LAST 173      13,2466  10 075 1               CCS      RUPTREG2
 0332   REF   1               13,2467  1 2473 1               TCF      MIN+
 0333   REF   1               13,2470  1 2406 0               TCF      STRTGYR2
 0334   REF   1               13,2471  1 2606 1               TCF      MIN-
 0335   REF   2 LAST 201      13,2472  1 2406 0               TCF      STRTGYR2
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0336  REF   1            13,2473  6 2527 0  MIN+      AD      -GYROMIN     SMALL POSITIVE COMMAND. SEE IF AT LEAST
0337                     13,2474  0 0006 1            EXTEND               16 GYRO PULSES.
0338  REF   3 LAST 201   13,2475  6 2406 1            BZMF    STRTGYR2

0339                     13,2476  0 0006 1  MAJ+      EXTEND               DEFINITE POSITIVE OUTPUT.
0340  REF   1            13,2477  3 2632 1            DCA     GYROFRAC
0341  REF  15 LAST 201   13,2500  20 075 1            DAS     RUPTREG1

0342  REF   6 LAST 201   13,2501  3 0071 1            CA      ITEMP4       SELECT POSITIVE TORQUING FOR THIS GYRO.
0343                     13,2502  0 0006 1            EXTEND
0344                     13,2503  05 014 1            WOR     14

0345  REF   5 LAST 154   13,2504  3 6027 1            CAF     LOW7         LEAVE NUMBER OF POSSIBLE 8192 AUGMENTS
0346  REF   8 LAST 201   13,2505  7 0075 1            MASK    RUPTREG2     TO INITIAL COMMAND IN MAJOR PART OF LONG
0347  REF   9 LAST 202   13,2506  56 075 0            XCH     RUPTREG2     TERM STORAGE AND TRUNCATED FRACTION
0348                     13,2507  0 0006 1  GMERGE    EXTEND               IN MINOR PART. THE MAJOR PART WILL BE
0349  REF  10 LAST 187   13,2510  7 7650 1            MP      BIT8         COUNTED DOWN TO ZERO IN THE COURSE OF
0350  REF   3 LAST   9   13,2511  54 066 0            TS      ITEMP2       PUTTING OUT THE ENTIRE COMMAND.
0351  REF  16 LAST 202   13,2512  3 0074 1            CA      RUPTREG1
0352                     13,2513  0 0006 1            EXTEND
0353  REF   5 LAST 190   13,2514  7 7647 1            MP      BIT9
0354  REF  17 LAST 202   13,2515  54 074 0            TS      RUPTREG1
0355  REF  38 LAST 192   13,2516  3 0001 0            CA      L
0356                     13,2517  0 0006 1            EXTEND
0357  REF  16 LAST 182   13,2520  7 7642 1            MP      BIT14
0358  REF   4 LAST 202   13,2521  26 066 0            ADS     ITEMP2       INITIAL COMMAND.

0359                     13,2522  0 0006 1            EXTEND               SEE IF MORE THAN ONE PULSE TRAIN NEEDED
0360  REF  18 LAST 202   13,2523  3 0075 0            DCA     RUPTREG1     (MORE THAN 16383 PULSES).
0361  REF   1            13,2524  6 7667 1            AD      MINUS1
0362  REF 113 LAST 200   13,2525  10 000 0            CCS     A
0363  REF   1            13,2526  1 2552 0            TCF     LONGGYRO
0364                     13,2527   77600 1  -GYROMIN  OCT     -177         MAY BE ADJUSTED TO SPECIFY MINIMUM CMD.

0365                     13,2530  1 2534 0            TCF     +4

0366  REF  17 LAST 202   13,2531  3 7642 0            CAF     BIT14
0367  REF   5 LAST 202   13,2532  26 066 0            ADS     ITEMP2
0368  REF  62 LAST 200   13,2533  3 7665 0            CAF     ZERO

0369  REF  14 LAST 201   13,2534  50 065 1  +4        INDEX   ITEMP1
0370                     13,2535  53'401 1            DXCH    1400
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 0371   REF   6 LAST 202     13,2536  3 0066 1            CA       ITEMP2           ENTIRE COMMAND.
 0372   REF   2 LAST 174     13,2537  54 047 0  LASTSEG   TS       GYROCMD
 0373                        13,2540  0 0006 1            EXTEND
 0374   REF  10 LAST 197     13,2541  7 7646 0            MP       BIT10            WAITLIST DT
 0375   REF   2 LAST  77     13,2542  6 6165 0            AD       THREE            TRUNCATION AND PHASE UNCERTAINTIES.
 0376   REF  17 LAST 198     13,2543  0 4536 0            TC       WAITLIST
 0377                        13,2544   02402 0            2CADR    STRTGYRO
C0377   REF   2 LAST 198     13,2545   26003 0
 0378   REF  11 LAST 203     13,2546  3 7646 1  GYROEXIT  CAF      BIT10            TURN ON GYRO ACTIVITY TO START TRAIN.
 0379                        13,2547  0 0006 1            EXTEND
 0380                        13,2550  05 014 1            WOR      14
 0381   REF  14 LAST 196     13,2551  1 4602 0            TCF      TASKOVER

 0382   REF  15 LAST 202     13,2552  50 065 1  LONGGYRO  INDEX    ITEMP1
 0383                        13,2553  53'401 1            DXCH     1400             INITIAL COMMAND OUT PLUS N AUGMENTS OF
 0384   REF  18 LAST 202     13,2554  3 7642 0            CAF      BIT14            8192. INITIAL COMMAND IS AT LEAST 8192.
 0385   REF   7 LAST 203     13,2555  6 0066 1            AD       ITEMP2
 0386   REF   3 LAST 203     13,2556  54 047 0            TS       GYROCMD

 0387                        13,2557  0 0006 1  AUG3      EXTEND                    GET WAITLIST DT TO TIME WHEN TRAIN IS
 0388   REF  12 LAST 203     13,2560  7 7646 0            MP       BIT10            ALMOST OUT.
 0389   REF   1              13,2561  6 7671 0            AD       NEG3
 0390   REF  18 LAST 203     13,2562  0 4536 0            TC       WAITLIST
 0391                        13,2563   02566 0            2CADR    8192AUG
C0391   REF   1              13,2564   26003 0
 0392   REF   1              13,2565  1 2546 0            TCF      GYROEXIT

 0393   REF   5 LAST 200     13,2566  0 2643 1  8192AUG   TC       CAGETEST

 0394   REF   9 LAST 201     13,2567  3 0357 0            CA       LGYRO            ADD 8192 PULSES TO GYROCMD
 0395   REF   6 LAST 201     13,2570  54 003 0            TS       EBANK
 0396   REF   3 LAST 201     13,2571  7 5235 1            MASK     LOW8
 0397   REF  16 LAST 203     13,2572  54 065 0            TS       ITEMP1

 0398   REF  17 LAST 203     13,2573  50 065 1            INDEX    ITEMP1           SEE IF THIS IS THE LAST AUG.
 0399                        13,2574  11'400 0            CCS      1400
 0400   REF   1              13,2575  1 2601 0            TCF      AUG2             MORE TO COME.

 0401   REF  19 LAST 203     13,2576  3 7642 0            CAF      BIT14
 0402   REF   4 LAST 203     13,2577  26 047 0            ADS      GYROCMD
 0403   REF   1              13,2600  1 2540 0            TCF      LASTSEG +1

 0404   REF  18 LAST 203     13,2601  50 065 1  AUG2      INDEX    ITEMP1
 0405                        13,2602  55'400 0            TS       1400
 0406   REF  20 LAST 203     13,2603  3 7642 0            CAF      BIT14
 0407   REF   5 LAST 203     13,2604  26 047 0            ADS      GYROCMD
 0408   REF   1              13,2605  1 2557 0            TCF      AUG3             COMPUTE DT.
```

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L       IMU MODE SWITCHING ROUTINES                                               USER'S OWN PAGE NO.  16

 0409   REF   2 LAST 202     13,2606  6 2527 0  MIN-      AD       -GYROMIN       POSSIBLE NEGATIVE OUTPUT.
 0410                        13,2607  0 0006 1            EXTEND
 0411   REF   4 LAST 202     13,2610  6 2406 1            BZMF     STRTGYR2

 0412                        13,2611  0 0006 1  MAJ-      EXTEND                  DEFINITE NEGATIVE OUTPUT.
 0413   REF   2 LAST 202     13,2612  4 2632 0            DCS      GYROFRAC
 0414   REF  19 LAST 202     13,2613  20 075 1            DAS      RUPTREG1

 0415   REF   7 LAST 202     13,2614  3 0071 1            CA       ITEMP4         SELECT NEGATIVE TORQUING FOR THIS GYRO.
 0416   REF   6 LAST 202     13,2615  6 7647 0            AD       BIT9
 0417                        13,2616  0 0006 1            EXTEND
 0418                        13,2617  05 014 1            WOR      14

 0419   REF  20 LAST 204     13,2620  4 0074 0            CS       RUPTREG1       SET UP RUPTREGS TO FALL INTO GMERGE.
 0420   REF  21 LAST 204     13,2621  54 074 0            TS       RUPTREG1       ALL NUMBERS PUT INTO GYROCMD ARE
 0421   REF  10 LAST 202     13,2622  4 0075 1            CS       RUPTREG2       POSITIVE - BIT9 OF CHAN 14 DETERMINES
 0422   REF   6 LAST 202     13,2623  7 6027 0            MASK     LOW7           THE SIGN OF THE COMMAND.
 0423                        13,2624  4 0000 0            COM
 0424   REF  11 LAST 204     13,2625  56 075 0            XCH      RUPTREG2
 0425                        13,2626  4 0000 0            COM
 0426   REF   1              13,2627  1 2507 0            TCF      GMERGE

 0427                        13,2630   01700 1  GDESELCT  OCT      1700           TURN OFF SELECT AND ACTIVITY BITS.

 0428                        13,2631   00000 1  GYROFRAC  2DEC     .215 B -21
C0428                        13,2632   00034 0
```

```
P0429              IMU MODE SWITCHING ROUTINES COME HERE WHEN ACTION COMPLETE.

 0430                            13,2633  0 0006 1  ENDIMU    EXTEND                      MODE IS BAD IF CAGE HAS OCCURED OR IF
 0431                            13,2634  00 011 1            READ    11                  ISS WARNING IS ON.
 0432   REF  11 LAST 197         13,2635  7 7657 0            MASK    BIT1
 0433   REF 114 LAST 202         13,2636  10 000 0            CCS     A
 0434   REF   3 LAST 194         13,2637  1 2641 1            TCF     IMUBAD

 0435   REF   1                  13,2640  1 2667 0  IMUGOOD   TCF     GOODEND             WITH C(A) = 0.

 0436   REF  63 LAST 202         13,2641  3 7665 0  IMUBAD    CAF     ZERO
 0437   REF   1                  13,2642  1 2664 0            TCF     BADEND

 0438   REF  16 LAST 200         13,2643  3 7652 1  CAGETEST  CAF     BIT6                SUBROUTINE TO TERMINATE IMU MODE
 0439   REF  49 LAST 197         13,2644  7 0367 1            MASK    IMODES30            SWITCH IF IMU HAS BEEN CAGED.
 0440   REF 115 LAST 205         13,2645  10 000 0            CCS     A
 0441   REF   4 LAST 205         13,2646  1 2641 1            TCF     IMUBAD              DIRECTLY.
 0442   REF 109 LAST 201         13,2647  0 0002 0            TC      Q                   WITH C(A) = +0.

 0443   REF  50 LAST 205         13,2650  4 0367 1  CAGETSTQ  CS      IMODES30            SKIP IF IMU NOT BEING CAGED.
 0444   REF  17 LAST 205         13,2651  7 7652 0            MASK    BIT6
 0445   REF 116 LAST 205         13,2652  10 000 0            CCS     A
 0446   REF 110 LAST 205         13,2653  24 002 0            INCR    Q
 0447   REF 111 LAST 205         13,2654  0 0002 0            TC      Q

 0448   REF  51 LAST 205         13,2655  4 0367 1  CAGETSTJ  CS      IMODES30            IF DURING MODE SWITCH INITIALIZATION
 0449   REF  18 LAST 205         13,2656  7 7652 0            MASK    BIT6                IT IS FOUND THAT THE IMU IS BEING CAGED,
 0450   REF 117 LAST 205         13,2657  10 000 0            CCS     A                   SET IMUCADR TO -0 TO INDICATE OPERATION
 0451   REF 112 LAST 205         13,2660  0 0002 0            TC      Q                   COMPLETE BUT FAILED. RETURN IMMEDIATELY

 0452   REF  64 LAST 205         13,2661  4 7665 1            CS      ZERO                TO SWRETURN.
 0453   REF   2 LAST 158         13,2662  54 371 0            TS      IMUCADR
 0454   REF   8 LAST 198         13,2663  1 2033 1            TCF     MODEEXIT
```

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L      IMU MODE SWITCHING ROUTINES                                                        USER'S OWN PAGE NO.  18

P0455          GENERALIZED MODE SWITCHING TERMINATION. ENTER AT GOODEND FOR SUCCESSFUL COMPLETION OF AN I/O OPERATION
R0457  OR AT BADEND FOR A N UNSUCCESSFUL ONE. C(A) OR ARRIVAL =0 FOR IMU, 1 FOR AOT, AND 2 FOR RADARS.

 0459  REF  12 LAST 204     13,2664  54 075 1  BADEND   TS      RUPTREG2         DEVICE INDEX.
 0460  REF  65 LAST 205     13,2665  4 7665 1           CS      ZERO             FOR FAILURE.
 0461  REF   2 LAST 205     13,2666  1 2671 1           TCF     GOODEND +2

 0462  REF  13 LAST 206     13,2667  54 075 1  GOODEND  TS      RUPTREG2
 0463  REF  36 LAST 199     13,2670  4 7657 0           CS      ONE              FOR SUCCESS.

 0464  REF   4 LAST  32     13,2671  54 076 1           TS      RUPTREG3
 0465  REF  14 LAST 206     13,2672  50 075 0           INDEX   RUPTREG2         SEE IF USING PROGRAM ASLEEP.
 0466  REF   4 LAST  15     13,2673  10 371 0           CCS     MODECADR
 0467                       13,2674  1 2676 0           TCF     +2               YES - WAKE IT UP.
 0468  REF   1              13,2675  1 2706 0           TCF     ENDMODE          IF 0, PROGRAM NOT IN YET.

 0469  REF  66 LAST 206     13,2676  3 7665 0           CAF     ZERO             WAKE SLEEPING PROGRAM.
 0470  REF  15 LAST 206     13,2677  50 075 0           INDEX   RUPTREG2
 0471  REF   5 LAST 206     13,2700  56 371 1           XCH     MODECADR
 0472  REF   2 LAST 200     13,2701  0 4422 1           TC      JOBWAKE

 0473  REF   5 LAST 206     13,2702  4 0076 1           CS      RUPTREG3         ADVANCE LOC IF SUCCESSFUL.
 0474  REF  19 LAST 200     13,2703  50 071 1           INDEX   LOCCTR
 0475  REF  41 LAST 137     13,2704  26 150 1           ADS     LOC

 0476  REF  15 LAST 203     13,2705  1 4602 0           TCF     TASKOVER

 0477  REF   6 LAST 206     13,2706  3 0076 0  ENDMODE  CA      RUPTREG3         -0 INDICATES OPERATION COMPLETE BUT
 0478  REF  16 LAST 206     13,2707  50 075 0           INDEX   RUPTREG2         UNSUCCESSFUL - -1 INDICATES COMPLETE AND
 0479  REF   6 LAST 206     13,2710  54 371 0           TS      MODECADR         SUCCESSFUL.
 0480  REF  16 LAST 206     13,2711  1 4602 0           TCF     TASKOVER
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L        IMU MODE SWITCHING ROUTINES                                                       USER'S OWN PAGE NO.  19

P0481               GENERAL STALLING ROUTINE. USING PROGRAMS COME HERE TO WAIT FOR I/O COMPLETION.

 0483    REF  20 LAST 198      13,2712  3 7656 0  RADSTALL CAF     TWO                 RR AND LR STALL.
 0484    REF   1               13,2713  1 2717 0           TCF     STALL

 0485    REF  37 LAST 206      13,2714  3 7657 1  AOTSTALL CAF     ONE                 AOT.
 0486    REF   2 LAST 207      13,2715  0 2717 1           TC      STALL

 0487    REF   1                          13,2714  OPTSTALL EQUALS AOTSTALL

 0488    REF   1                          13,2712  LOTSTALL EQUALS RADSTALL
 0489    REF  67 LAST 206      13,2716  3 7665 0  IMUSTALL CAF     ZERO                IMU.

 0490                          13,2717  0 0004 0  STALL    INHINT
 0491    REF  17 LAST 206      13,2720  54 075 1           TS      RUPTREG2            SAVE DEVICE INDEX.
 0492    REF 118 LAST 205      13,2721  50 000 1           INDEX   A                   SEE IF OPERATION COMPLETE.
 0493    REF   7 LAST 206      13,2722  10 371 0           CCS     MODECADR
 0494    REF   1               13,2723  1 2741 0           TCF     MODABORT            ALLOWABLE STATES ARE +0, -1, AND -0.
 0495    REF   1               13,2724  1 2735 0           TCF     MODESLP             OPERATION INCOMPLETE.
 0496    REF   1               13,2725  1 2731 1           TCF     MODEGOOD            COMPLETE AND GOOD IF = -1.

 0497    REF  18 LAST 207      13,2726  50 075 0  MG2      INDEX   RUPTREG2            COMPLETE AND FAILED IF -0. RESET TO +0.
 0498    REF   8 LAST 207      13,2727  54 371 0           TS      MODECADR            RETURN TO CALLER.
 0499    REF   9 LAST 205      13,2730  1 2033 1           TCF     MODEEXIT

 0500    REF 119 LAST 207      13,2731  10 000 0  MODEGOOD CCS     A                   MAKE SURE INITIAL STATE -1.
 0501    REF   2 LAST 207      13,2732  1 2741 0           TCF     MODABORT

 0502    REF  21 LAST 199      13,2733  24 117 0           INCR    BUF2                IF SO, INCREMENT RETURN ADDRESS AND
 0503    REF   1               13,2734  1 2726 1           TCF     MG2                 RETURN IMMEDIATELY, SETTING CADR = +0.

 0504    REF   1               13,2735  0 4112 1  MODESLP  TC      MAKECADR            CALL FROM SWITCHABLE FIXED ONLY.
 0505    REF  19 LAST 207      13,2736  50 075 0           INDEX   RUPTREG2
 0506    REF   9 LAST 207      13,2737  54 371 0           TS      MODECADR
 0507    REF   2 LAST 199      13,2740  1 4416 1           TCF     JOBSLEEP

 0508    REF   6 LAST 144      13,2741  0 5446 1  MODABORT TC      ABORT               TWO PROGRAMS USING SAME DEVICE.
 0509                          13,2742   01210 0           OCT     1210
```

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P0510              CONSTANTS FOR MODE SWITCHING ROUTINES

 0511                        13,2743   00014 1  BITS3&4  OCT     14
 0512                        13,2744   00050 1  BITS4&6  OCT     00050
 0513                        13,2745   00070 0  BITS4-6  OCT     00070
 0514   REF  11 LAST 202                 7650  IMUSEFLG EQUALS BIT8           INTERPRETER SWITCH 7.
 0515                        13,2746   70000 0  13,14,15 OCT     70000

 0516                        13,2747   77500 1  -COMMAX  DEC     -191
 0517                        13,2750   77477 0  -COMMAX- DEC     -192
 0518                        13,2751   00074 1  600MS    DEC     60
 0519   REF   2 LAST 170                 4762  3SECSM   EQUALS 3SECS
 0520                        13,2752   21450 0  90SEC    DEC     9000

 0521                                 13,2753  ENDIMODS EQUALS
```

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L        IMU COMPENSATION PACKAGE                                                    USER'S OWN PAGE NO.   1
 0001                                       07,2000           BANK    7
 0002    REF   2 LAST  18                        E3           EBANK= NBDX

R0003    PROGRAM DESCRIPTION- IMU COMPENSATION (LEM)                                DATE- 30 AUG 66
R0005    MOD NO- 0                                                                  LOG SECTION- IMU COMPENSATION PACKAGE
R0007    MOD BY- GILBERT                                                            ASSEMBLY- SUNBURST REVISION 13

R0009    FUNCTIONAL DESCRIPTION
R0010          THE IMU COMPENSATION PACKAGE IS DESIGNED TO COMPENSATE FOR PIPA BIAS AND SCALE FACTOR ERROR AND AT THE
R0012    SAME TIME ACCUMULATE GYRO TORQUING COMMANDS NECESSARY TO COMPENSATE FOR THE ASSOCIATED BIAS AND ACCELERATION-
R0014    CAUSED GYRO DRIFTS. 1/PIPA MUST BE CALLED AT LEAST EVERY 2.55 SECONDS DUE TO SCALING CONSIDERATIONS.
R0016    SPECIFICALLY, THE CORRECTION IS

R0017          PIPA  = (1 + SCALE FACTOR ERROR)PIPA  - (BIAS)(DELTAT)
R0018              C                               I

R0019    WHERE PIPA  IS THE COMPENSATED DATA OBTAINED FROM THE SAMPLED DATA PIPA
R0020              C                                                            I

R0021    THE COMPENSATED DATA IS THEN USED TO COMPUTE THE IRIG TORQUING NECESSARY TO CANCEL THE NBD, ADIA, AND ADSRA
R0023    GYRO COEFFICIENTS.
R0024    SPECIFICALLY, THE COMPUTATIONS ARE

R0025          XIRIG     -(ADIAX)(PIPAX )  + (ADSRAX)(PIPAY )  - (NBDX)(DELTAT)
R0026                                 C                  C
R0027          YIRIG     -(ADIAY)(PIPAY )  + (ADSRAY)(PIPAZ )  - (NBDY)(DELTAT)
R0028                                 C                  C
R0029          ZIRIG     -(ADIAZ)(PIPAZ )  - (ADSRAZ)(PIPAY )  + (NBDZ)(DELTAT)
R0030                                 C                  C

R0031    THIS COMPENSATION IS SUMMED INTO THE GCOMP REGISTERS AND WHEN THE MAGNITUDE OF ANY IRIG COMMAND EXCEEDS 2
R0033    PULSES, THE COMMANDS ARE SENT TO THE GYROS.

R0034    DURING FREE-FALL PHASES OF A FLIGHT NBDX, NBDY, AND NBDZ ARE THE ONLY RELEVANT COEFFICIENTS. THESE BIAS TERMS
R0036    WILL BE INTEGRATED BY ROUTINE NBDONLY APPROXIMATELY EVERY 81.93 SECONDS FOLLOWING AN EXECUTIVE CALL BY THE DUMMY
R0038    TASK OF THE WAITLIST PROGRAM. NBDONLY IS ENABLED WHEN BIT 15 OF FLAGWRD2 IS SET TO INDICATE FREE-FALL. DURING
R0040    THIS TIME 1/PIPA IS NOT CALLED.

R0041    LASTBIAS IS CALLED VIA EXECUTIVE WHEN MAKING THE TRANSITION FROM FREE-FALL TO A PIPA READING MODE. THE NBD TERMS
R0043    ARE COMPENSATED FOR FROM THE LAST NBDONLY CALL UP TO PIPA ZEROING. PREREAD WILL THEN ENABLE 1/PIPA AT ITS
R0045    REGULAR INTERVAL. THE DRIFT FLAG MUST BE DOWN JUST PRIOR TO LASTBIAS. GYROCOMPASS NEVER CALLS LASTBIAS.

R0046    SCALING CONSIDERATIONS
R0047                                  UNITS                MAX. VALUE     INTERNAL UNITS AND SCALING

R0049          PIPA BIAS               (CM)/(SEC)(SEC)      3.125          (PIPA PULSES)/(CS) X 2(-5)
R0051          PIPA SCALE FACTOR       P.P.M.               1953.125       (PPM) X 2(-9)
R0053          NBD                     MERU                 128.74604      (GYRO PULSES)/(CS) X 2(-5)
R0055          ADIA                    (MERU)/(G)           630.36633      (GYRO PULSES)/(PIPA PULSE) X 2(-6)
R0057          ADSRA                   (MERU)/(G)           630.36633      (GYRO PULSES)/(PIPA PULSE) X 2(-6)
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L       IMU COMPENSATION PACKAGE                                                       USER'S OWN PAGE NO.   2

R0059   CONVERSION TABLE
R0060         1 PIPA PULSE = 1.00 (CM)/(SEC)(SEC)                1 ERU = 7.29209817 X 10(-5) (RAD)/(SEC)
R0062         1 ERU = 15.04104488 (ARCSEC)/(SEC)                 1 (CM)/(SEC)(SEC) = .01 (PIPA PULSES)/(CS)
R0064         1 GYRO PULSE = .61798096 ARCSEC                    1 MERU = .0024272592 (GYRO PULSES)/(CS)
R0066         1 G = 979.24 (CM)/(SEC)(SEC)  (AMR)                1 (MERU)/(G) = .000144787174 (GYRO PULSES)/(PIPA PULSE)

R0068   REFERENCES
R0069         AGC PROGRAMMING MEMO NO. 12, I.S.S. MEMO NO. 247, I.S.S. MEMO NO. 328, I.S.S. MEMO NO. 339

R0071   CALLING SEQUENCE
R0072         L         TC       BANKCALL
R0073         L+1       CADR     1/PIPA
R0074         L+2                               RETURNS HERE

R0075   NORMAL EXIT MODES
R0076         AT L+2 OF CALLING SEQUENCE

R0077   ALARM OR ABORT MODES
R0078         ENDOFJOB

R0079   ERASABLE INITIALIZATION REQUIRED (CONSECUTIVE LOCATIONS)
R0080         PBIASX    PIPAX BIAS
R0081         PIPASCFX  PIPAX SCALE FACTOR ERROR
R0082         PBIASY    PIPAY BIAS
R0083         PIPASCFY  PIPAY SCALE FACTOR ERROR
R0084         PBIASZ    PIPAZ BIAS
R0085         PIPASCFZ  PIPAZ SCALE FACTOR ERROR
R0086         NBDX      X IRIG BIAS DRIFT
R0087         NBDY      Y IRIG BIAS DRIFT
R0088         NBDZ      Z IRIG BIAS DRIFT
R0089         ADIAX     IRIG ACCELERATION SENSITIVE DRIFT ALONG THE X INPUT AXIS
R0090         ADIAY     IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Y INPUT AXIS
R0091         ADIAZ     IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Z INPUT AXIS
R0092         ADSRAX    IRIG ACCELERATION SENSITIVE DRIFT ALONG THE X SPIN REFERENCE AXIS
R0094         ADSRAY    IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Y SPIN REFERENCE AXIS
R0096         ADSRAZ    IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Z SPIN REFERENCE AXIS
R00975        GCOMP     GYRO COMPENSATION PULSES (SET = ZERO FOR 1ST PASS)

R0098   INPUT
R0099         1/PIPADT - DELTA TIME SCALED AT (CS) X 2(+8)
R0100         DELVX, DELVY, DELVZ - PIPA READINGS IN THE MAJOR PARTS - MINOR PARTS IRRELEVANT

R0102   OUTPUT
R0103         DELVX, DELVY, DELVZ - PIPA COUNTS SCALED 2(+14) COMPENSATED FOR PIPA BIAS AND SCALE FACTOR ERROR
R0105         GCOMP - 3 DP LOCATIONS CONTAINING GYRO PULSES TO COMPENSATE FOR NBD, ADIA, AND ADSRA COEFFICIENTS

R0107   DEBRIS
R0108         CENTRALS - A,L,Q
R0109         OTHER - BUF - BUF +2, V3UF - VBUF +2, GCOMPSW
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L        IMU COMPENSATION PACKAGE                                                  USER'S OWN PAGE NO.   3

 0110    REF   1                07,2000  3 2233 1  1/PIPA    CAF     LGCOMP        SAVE EBANK OF CALLING PROGRAM
 0111    REF   7 LAST 203       07,2001  56 003 1            XCH     EBANK
 01112   REF  23 LAST 106       07,2002  54 147 1            TS      MODE

 01113   REF   5 LAST 201       07,2003  3 7655 0            CAF     FOUR          PIPAZ, PIPAY, PIPAX
 01114   REF  83 LAST 158       07,2004  54 116 0            TS      BUF +2

 0112    REF 120 LAST 207       07,2005  50 000 1            INDEX   A
 0113    REF   3 LAST  25       07,2006  3 0403 0            CA      DELVX         CONTAINS PREVIOUS PIPA READING
 0114    REF  43 LAST 103       07,2007  54 106 1            TS      VBUF          TEMPORARY - MINOR PARTS IRRELEVANT

 0115    REF  84 LAST 211       07,2010  50 116 1            INDEX   BUF +2
 0116    REF   1                07,2011  4 1432 1            CS      PIPABIAS      (PIPA PULSES)/(CS) X 2(-5)             *
 0117                           07,2012  0 0006 1            EXTEND
 0118    REF   2 LAST  17       07,2013  7 1110 1            MP      1/PIPADT      (CS) X 2(+8)  NOW (PIPA PULSES) X 2(+3)*
 0119                           07,2014  0 0006 1            EXTEND                                                       *
 0120    REF  11 LAST 200       07,2015  7 7654 0            MP      BIT4          SCALE 2(-3)       SHIFT LEFT 3         *
 0121    REF  44 LAST 211       07,2016  22 107 1            LXCH    VBUF +1       (PIPA PULSES) X 2(0)   FRACTIONAL PULSE*

 0122    REF  85 LAST 211       07,2017  50 116 1            INDEX   BUF +2
 0123    REF   1                07,2020  3 1433 1            CA      PIPASCF       (P.P.M.) X 2(-9)
 0124                           07,2021  0 0006 1            EXTEND
 0125    REF  45 LAST 211       07,2022  7 0106 1            MP      VBUF          (PIPA PULSES) X 2(+14)
 0126    REF  46 LAST 211       07,2023  22 110 1            LXCH    VBUF +2       SAVE FOR FRACTIONAL COMPUTATION
 0127                           07,2024  0 0006 1            EXTEND
 0128    REF  19 LAST 205       07,2025  7 7652 0            MP      BIT6          SCALE 2(+9)    NOW PIPA PULSES X 2(+14)
 0129    REF  47 LAST 211       07,2026  20 107 0            DAS     VBUF          (PIPAI) - (NBD)(DELTAT) - HI(PIPAI)(SFE)

 0130    REF  48 LAST 211       07,2027  3 0110 1            CA      VBUF +2       NOW MINOR PART
 0131                           07,2030  0 0006 1            EXTEND
 0132    REF  20 LAST 211       07,2031  7 7652 0            MP      BIT6          SCALE 2(+9)    SHIFT RIGHT 9
 0133    REF  39 LAST 202       07,2032  54 001 1            TS      L
 0134    REF  68 LAST 207       07,2033  3 7665 0            CAF     ZERO
 0135    REF  49 LAST 211       07,2034  20 107 0            DAS     VBUF          (PIPAI) - (NBD)(DELTAT) - (PIPAI)(SFE)

 0136                           07,2035  0 0006 1            EXTEND
 0137    REF  50 LAST 211       07,2036  3 0107 1            DCA     VBUF          RESTORE COMPENSATED PIPA READING
 0138    REF  86 LAST 211       07,2037  50 116 1            INDEX   BUF +2
 0139    REF   4 LAST 211       07,2040  52 404 0            DXCH    DELVX

 0140    REF  87 LAST 211       07,2041  10 116 0            CCS     BUF +2        PIPAZ, PIPAY, PIPAX
 0141    REF   2 LAST  76       07,2042  6 7667 1            AD      NEG1
 0142    REF   1                07,2043  1 2004 0            TCF     1/PIPA +4
 0143                           07,2044  1 2045 0            NOOP                  LESS THAN ZERO IMPOSSIBLE
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L       IMU COMPENSATION PACKAGE                                              USER'S OWN PAGE NO.   4

 0144   REF   1                07,2045  55 457 1  IRIGCOMP TS      GCOMPSW      INDICATE COMMANDS 2 PULSES OR LESS
 0145   REF  88 LAST 211       07,2046  54 114 1           TS      BUF          INDEX COUNTER - IRIGX, IRIGY, IRIGZ

 0146                          07,2047  0 0006 1  IRIGX    EXTEND
 0147   REF   5 LAST 211       07,2050  4 0404 0           DCS     DELVX        (PIPA PULSES) X 2(+14)
 0148   REF 384 LAST 199       07,2051  52 141 1           DXCH    MPAC
 0149   REF   1                07,2052  3 1443 0           CA      ADIAX        (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0150   REF   1                07,2053  0 2127 1           TC      GCOMPSUB     -(ADIAX)(PIPAX)    (GYRO PULSES) X 2(+14)

 0151                          07,2054  0 0006 1           EXTEND
 0152   REF   1                07,2055  4 0406 1           DCS     DELVY        (PIPA PULSES) X 2(+14)
 0153   REF 385 LAST 212       07,2056  52 141 1           DXCH    MPAC
 0154   REF   1                07,2057  4 1446 1           CS      ADSRAX       (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0155   REF   2 LAST 212       07,2060  0 2127 1           TC      GCOMPSUB     +(ADSRAX)(PIPAY)   (GYRO PULSES) X 2(+14)

 0156   REF   3 LAST 209       07,2061  4 1440 1           CS      NBDX         (GYRO PULSES)/(CS) X 2(-5)
 0157   REF   1                07,2062  0 2156 1           TC      DRIFTSUB     -(NBDX)(DELTAT)    (GYRO PULSES) X 2(+14)

 0158                          07,2063  0 0006 1  IRIGY    EXTEND
 0159   REF   2 LAST 212       07,2064  4 0406 1           DCS     DELVY        (PIPA PULSES) X 2(+14)
 0160   REF 386 LAST 212       07,2065  52 141 1           DXCH    MPAC
 0161   REF   1                07,2066  3 1444 1           CA      ADIAY        (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0162   REF   3 LAST 212       07,2067  0 2127 1           TC      GCOMPSUB     -(ADIAY)(PIPAY)    (GYRO PULSES) X 2(+14)

 0163                          07,2070  0 0006 1           EXTEND
 0164   REF   1                07,2071  4 0410 0           DCS     DELVZ        (PIPA PULSES) X 2(+14)
 0165   REF 387 LAST 212       07,2072  52 141 1           DXCH    MPAC
 0166   REF   1                07,2073  4 1447 0           CS      ADSRAY       (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0167   REF   4 LAST 212       07,2074  0 2127 1           TC      GCOMPSUB     +(ADSRAY)(PIPAZ)   (GYRO PULSES) X 2(+14)

 0168   REF   1                07,2075  4 1441 0           CS      NBDY         (GYRO PULSES)/(CS) X 2(-5)
 0169   REF   2 LAST 212       07,2076  0 2156 1           TC      DRIFTSUB     -(NBDY)(DELTAT)    (GYRO PULSES) X 2(+14)

 0170                          07,2077  0 0006 1  IRIGZ    EXTEND
 0171   REF   3 LAST 212       07,2100  4 0406 1           DCS     DELVY        (PIPA PULSES) X 2(+14)
 0172   REF 388 LAST 212       07,2101  52 141 1           DXCH    MPAC
 0173   REF   1                07,2102  3 1450 1           CA      ADSRAZ       (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0174   REF   5 LAST 212       07,2103  0 2127 1           TC      GCOMPSUB     -(ADSRAZ)(PIPAY    (GYRO PULSES) X 2(+14)

 0175                          07,2104  0 0006 1           EXTEND
 0176   REF   2 LAST 212       07,2105  4 0410 0           DCS     DELVZ        (PIPA PULSES) X 2(+14)
 0177   REF 389 LAST 212       07,2106  52 141 1           DXCH    MPAC
 0178   REF   1                07,2107  3 1445 0           CA      ADIAZ        (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
 0179   REF   6 LAST 212       07,2110  0 2127 1           TC      GCOMPSUB     -(ADIAZ)(PIPAZ)    (GYRO PULSES) X 2(+14)

 0180   REF   1                07,2111  3 1442 1           CA      NBDZ         (GYRO PULSES)/(CS) X 2(-5)
 0181   REF   3 LAST 212       07,2112  0 2156 1           TC      DRIFTSUB     +(NBDZ)(DELTAT)    (GYRO PULSES) X 2(+14)
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L       IMU COMPENSATION PACKAGE                                                          USER'S OWN PAGE NO.   5

 0182   REF   2 LAST 212      07,2113  11'457 1            CCS     GCOMPSW        ARE GYRO COMMANDS GREATER THAN 2 PULSES
 0183                         07,2114  1 2116 1            TCF     +2             YES
 0184   REF   1               07,2115  1 2124 0            TCF     IRIG1          NO

 0185                         07,2116  0 0004 0            INHINT
 0186   REF   2 LAST 140      07,2117  3 4533 0            CAF     PRIO35         SEND OUT GYRO TORQUING COMMANDS
 0187   REF   3 LAST 153      07,2120  0 4363 0            TC      NOVAC
 0188                         07,2121   02211 1            2CADR   1/GYRO
C0188   REF   1               07,2122   16003 0
 0189                         07,2123  0 0003 1            RELINT
 01892  REF  24 LAST 211      07,2124  3 0147 0  IRIG1     CA      MODE           SET EBANK FOR RETURN
 01893  REF   8 LAST 211      07,2125  54 003 0            TS      EBANK
 01895  REF   3 LAST 197      07,2126  1 4076 0            TCF     SWRETURN



 0190   REF 390 LAST 212      07,2127  56 140 1  GCOMPSUB  XCH     MPAC           ADIA OR ADSRA COEFFICIENT ARRIVES IN A
 0191                         07,2130  0 0006 1            EXTEND                 C(MPAC) = (PIPA PULSES) X 2(+14)
 0192   REF 391 LAST 213      07,2131  7 0140 0            MP      MPAC           (GYRO PULSES)/(PIPA PULSE) X 2(-6)       *
 0193   REF  51 LAST 211      07,2132  52 107 0            DXCH    VBUF           NOW = (GYRO PULSES) X 2(+8)              *

 0194   REF 392 LAST 213      07,2133  3 0141 0            CA      MPAC +1        MINOR PART PIPA PULSES
 0195                         07,2134  0 0006 1            EXTEND
 0196   REF 393 LAST 213      07,2135  7 0140 0            MP      MPAC           ADIA OR ADSRA
 0197   REF  40 LAST 211      07,2136  54 001 1            TS      L
 0198   REF  69 LAST 211      07,2137  3 7665 0            CAF     ZERO
 0199   REF  52 LAST 213      07,2140  20 107 0            DAS     VBUF           NOW = (GYRO PULSES) X 2(+8)              *

 0200   REF  53 LAST 213      07,2141  3 0106 0            CA      VBUF           PARTIAL RESULT - MAJOR
 0201                         07,2142  0 0006 1            EXTEND
 0202   REF   7 LAST 204      07,2143  7 7647 1            MP      BIT9           SCALE 2(+6)      SHIFT RIGHT 6           *
 0203   REF  89 LAST 212      07,2144  50 114 0            INDEX   BUF            RESULT = (GYRO PULSES) X 2(+14)
 0204   REF   9 LAST 194      07,2145  21'452 1            DAS     GCOMP          HI(ADIA)(PIPAI)  OR  HI(ADSRA)(PIPAI)

 0205   REF  54 LAST 213      07,2146  3 0107 1            CA      VBUF +1        PARTIAL RESULT - MINOR
 0206                         07,2147  0 0006 1            EXTEND
 0207   REF   8 LAST 213      07,2150  7 7647 1            MP      BIT9           SCALE 2(+6)      SHIFT RIGHT 6           *
 0208   REF  41 LAST 213      07,2151  54 001 1            TS      L
 0209   REF  70 LAST 213      07,2152  3 7665 0            CAF     ZERO
 0210   REF  90 LAST 213      07,2153  50 114 0            INDEX   BUF            RESULT = (GYRO PULSES) X 2(+14)
 0211   REF  10 LAST 213      07,2154  21'452 1            DAS     GCOMP          (ADIA)(PIPAI)  OR  (ADSRA)(PIPAI)

 0212   REF 113 LAST 205      07,2155  0 0002 0            TC      Q
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0213                      07,2156  0 0006 1  DRIFTSUB EXTEND
0214  REF  91 LAST 213    07,2157  22 115 1           QXCH    BUF +1

0215                      07,2160  0 0006 1           EXTEND            C(A) = NBD    (GYRO PULSES)/(CS) X 2(-5)
0216  REF   3 LAST 211    07,2161  7 1110 1           MP      1/PIPADT  (CS) X 2(+8)    NOW (GYRO PULSES) X 2(+3)
0217  REF 394 LAST 213    07,2162  22 141 0           LXCH    MPAC +1   SAVE FOR FRACTIONAL COMPENSATION
0218                      07,2163  0 0006 1           EXTEND
0219  REF  12 LAST 211    07,2164  7 7654 0           MP      BIT4      SCALE 2(+11)      SHIFT RIGHT 11
0220  REF  92 LAST 214    07,2165  50 114 0           INDEX   BUF
0221  REF  11 LAST 213    07,2166  21'452 1           DAS     GCOMP     HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

0222  REF 395 LAST 214    07,2167  3 0141 0           CA      MPAC +1   NOW MINOR PART
0223                      07,2170  0 0006 1           EXTEND
0224  REF  13 LAST 214    07,2171  7 7654 0           MP      BIT4      SCALE 2(+11)      SHIFT RIGHT 11
0225  REF  42 LAST 213    07,2172  54 001 1           TS      L
0226  REF  71 LAST 213    07,2173  3 7665 0           CAF     ZERO
0227  REF  93 LAST 214    07,2174  50 114 0           INDEX   BUF       ADD IN FRACTIONAL COMPENSATION
0228  REF  12 LAST 214    07,2175  21'452 1           DAS     GCOMP     (NBD)(DELTAT)     (GYRO PULSES) X 2(+14)

0229  REF  21 LAST 207    07,2176  3 7656 0  DRFTSUB2 CAF     TWO       PIPAX, PIPAY, PIPAZ
0230  REF  94 LAST 214    07,2177  6 0114 0           AD      BUF
0231  REF  95 LAST 214    07,2200  56 114 0           XCH     BUF
0232  REF 121 LAST 211    07,2201  50 000 1           INDEX   A
0233  REF  13 LAST 214    07,2202  11'451 1           CCS     GCOMP     ARE GYRO COMMANDS 1 PULSE OR GREATER
0234                      07,2203  1 2205 0           TCF     +2        YES
0235  REF  96 LAST 214    07,2204  0 0115 1           TC      BUF +1    NO

0236  REF   1             07,2205  7 2255 0           MASK    COMPCHK   DEC -1
0237  REF 122 LAST 214    07,2206  10 000 0           CCS     A         ARE GYRO COMMANDS GREATER THAN 2 PULSES
0238  REF   3 LAST 213    07,2207  55'457 1           TS      GCOMPSW   YES - SET GCOMPSW POSITIVE
0239  REF  97 LAST 214    07,2210  0 0115 1           TC      BUF +1    NO
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0240  REF   6 LAST 211   07,2211  3 7655 0  1/GYRO   CAF    FOUR          PIPAZ, PIPAY, PIPAX
0241  REF  98 LAST 214   07,2212  54 114 1           TS     BUF

0242  REF  99 LAST 215   07,2213  50 114 0           INDEX  BUF           SCALE GYRO COMMANDS FOR IMUPULSE
0243  REF  14 LAST 214   07,2214  3 1452 0           CA     GCOMP +1      FRACTIONAL PULSES
0244                     07,2215  0 0006 1           EXTEND
0245  REF  12 LAST 208   07,2216  7 7650 1           MP     BIT8          SHIFT RIGHT 7
0246  REF 100 LAST 215   07,2217  50 114 0           INDEX  BUF
0247  REF  15 LAST 215   07,2220  55'452 1           TS     GCOMP +1      FRACTIONAL PULSES SCALED

0248  REF  72 LAST 214   07,2221  3 7665 0           CAF    ZERO          SET GCOMP = 0 FOR DAS INSTRUCTION
0249  REF 101 LAST 215   07,2222  50 114 0           INDEX  BUF
0250  REF  16 LAST 215   07,2223  57'451 0           XCH    GCOMP         GYRO PULSES
0251                     07,2224  0 0006 1           EXTEND
0252  REF  13 LAST 215   07,2225  7 7650 1           MP     BIT8          SHIFT RIGHT 7
0253  REF 102 LAST 215   07,2226  50 114 0           INDEX  BUF
0254  REF  17 LAST 215   07,2227  21'452 1           DAS    GCOMP         ADD THESE TO FRACTIONAL PULSES ABOVE

0255  REF 103 LAST 215   07,2230  10 114 1           CCS    BUF           PIPAZ, PIPAY, PIPAX
0256  REF   3 LAST 211   07,2231  6 7667 1           AD     NEG1
0257  REF   2 LAST 213   07,2232  1 2212 0           TCF    1/GYRO +1
0258  REF  18 LAST 215   07,2233   01451 0  LGCOMP   ECADR  GCOMP         LESS THAN ZERO IMPOSSIBLE

0259  REF   2 LAST 211   07,2234  3 2233 1           CAF    LGCOMP
0260  REF   2 LAST 152   07,2235  0 4063 0           TC     BANKCALL
0261  REF   1            07,2236   26317 0           CADR   IMUPULSE      CALL GYRO TORQUING ROUTINE
0262  REF   3 LAST 215   07,2237  0 4063 0           TC     BANKCALL
0263  REF   1            07,2240   26716 0           CADR   IMUSTALL      WAIT FOR PULSES TO GET OUT
0264  REF   1            07,2241  1 4440 1           TCF    ENDOFJOB      TEMPORARY

0265  REF   7 LAST 215   07,2242  3 7655 0  GCOMP1   CAF    FOUR          PIPAZ, PIPAY, PIPAX
0266  REF 104 LAST 215   07,2243  54 114 1           TS     BUF

0267  REF 105 LAST 215   07,2244  50 114 0           INDEX  BUF           RESCALE
0268  REF  19 LAST 215   07,2245  3 1452 0           CA     GCOMP +1
0269                     07,2246  0 0006 1           EXTEND
0270  REF  14 LAST 215   07,2247  7 7650 1           MP     BIT8          SHIFT MINOR PART LEFT 7 - MAJOR PART = 0
0271  REF 106 LAST 215   07,2250  50 114 0           INDEX  BUF
0272  REF  20 LAST 215   07,2251  23'452 0           LXCH   GCOMP +1      BITS 8-14 OF MINOR PART WERE = 0

0273  REF 107 LAST 215   07,2252  10 114 1           CCS    BUF           PIPAZ, PIPAY, PIPAX
0274  REF   4 LAST 215   07,2253  6 7667 1           AD     NEG1
0275  REF   1            07,2254  1 2243 1           TCF    GCOMP1 +1
0276                     07,2255   77776 1  COMPCHK  DEC    -1            LESS THAN ZERO IMPOSSIBLE
0277  REF   2 LAST 215   07,2256  1 4440 1           TCF    ENDOFJOB
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0278  REF   2 LAST  28     07,2257  3 0025 0  NBDONLY  CA      TIME1        (CS) X 2(+14)
0279  REF   4 LAST 214     07,2260  57'110 0           XCH     1/PIPADT     PREVIOUS TIME
0280                       07,2261  4 0000 0           COM
0281  REF   5 LAST 216     07,2262  6 1110 0           AD      1/PIPADT
0282  REF 123 LAST 214     07,2263  10 000 0  NBD2     CCS     A            CALCULATE ELAPSED TIME
0283  REF  38 LAST 207     07,2264  6 7657 1           AD      ONE          NO TIME1 OVERFLOW
0284  REF   1              07,2265  1 2272 0           TCF     NBD3         RESTORE TIME DIFFERENCE AND JUMP
0285                       07,2266  1 2270 1           TCF     +2           TIME1 OVERFLOW
0286  REF   3 LAST 215     07,2267  1 4440 1           TCF     ENDOFJOB     IF ELAPSED TIME = 0  (DIFFERENCE = -0)

0287                       07,2270  4 0000 0           COM                  CALCULATE ABSOLUTE DIFFERENCE
0288  REF  18 LAST 182     07,2271  6 7637 1           AD      POSMAX

0289                       07,2272  0 0006 1  NBD3     EXTEND               C(A) = DELTAT    (CS) X 2(+14)
0290  REF  13 LAST 203     07,2273  7 7646 0           MP      BIT10        SHIFT RIGHT 5
0291  REF  55 LAST 213     07,2274  52 107 0           DXCH    VBUF
0292                       07,2275  0 0006 1           EXTEND
0293  REF  56 LAST 216     07,2276  3 0107 1           DCA     VBUF
0294  REF 396 LAST 214     07,2277  52 141 1           DXCH    MPAC         DELTAT NOW SCALED (CS) X 2(+19)

0295  REF  73 LAST 215     07,2300  3 7665 0           CAF     ZERO
0296  REF   4 LAST 214     07,2301  55'457 1           TS      GCOMPSW      INDICATE COMMANDS 2 PULSES OR LESS
0297  REF 108 LAST 215     07,2302  54 114 1           TS      BUF          PIPAX, PIPAY, PIPAZ

0298  REF   4 LAST 212     07,2303  4 1440 1           CS      NBDX         (GYRO PULSES)/(CS) X 2(-5)
0299  REF   1              07,2304  0 2322 0           TC      FBIASSUB     -(NBDX)(DELTAT)    (GYRO PULSES) X 2(+14)

0300                       07,2305  0 0006 1           EXTEND
0301  REF  57 LAST 216     07,2306  4 0107 0           DCS     VBUF
0302  REF 397 LAST 216     07,2307  52 141 1           DXCH    MPAC         DELTAT SCALED (CS) X 2(+19)
0303  REF   2 LAST 212     07,2310  3 1441 1           CA      NBDY         (GYRO PULSES)/(CS) X 2(-5)
0304  REF   2 LAST 216     07,2311  0 2322 0           TC      FBIASSUB     -(NBDY)(DELTAT)    (GYRO PULSES) X 2(+14)

0305                       07,2312  0 0006 1           EXTEND
0306  REF  58 LAST 216     07,2313  4 0107 0           DCS     VBUF
0307  REF 398 LAST 216     07,2314  52 141 1           DXCH    MPAC         DELTAT SCALED (CS) X 2(+19)
0308  REF   2 LAST 212     07,2315  4 1442 0           CS      NBDZ         (GYRO PULSES)/(CS) X 2(-5)
0309  REF   3 LAST 216     07,2316  0 2322 0           TC      FBIASSUB     +(NBDZ)(DELTAT)    (GYRO PULSES) X 2(+14)

0310  REF   5 LAST 216     07,2317  11'457 1           CCS     GCOMPSW      ARE GYRO COMMANDS GREATER THAN 2 PULSES
0311  REF   3 LAST 215     07,2320  1 2211 0           TCF     1/GYRO       YES
0312  REF   4 LAST 216     07,2321  1 4440 1           TCF     ENDOFJOB     NO
```

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 0313    REF 114 LAST 213      07,2322  56 002 0  FBIASSUB XCH     Q
 0314    REF 109 LAST 216      07,2323  54 115 0           TS      BUF +1

 0315    REF 115 LAST 217      07,2324  3 0002 0           CA      Q                NBD SCALED (GYRO PULSES)/(CS) X 2(-5)
 0316                          07,2325  0 0006 1           EXTEND
 0317    REF 399 LAST 216      07,2326  7 0140 0           MP      MPAC             DELTAT SCALED (CS) X 2(+19)
 03175   REF 110 LAST 217      07,2327  50 114 0           INDEX   BUF
 0318    REF  21 LAST 215      07,2330  21'452 1           DAS     GCOMP            HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

 0319    REF 116 LAST 217      07,2331  3 0002 0           CA      Q                NOW FRACTIONAL PART
 0320                          07,2332  0 0006 1           EXTEND
 0321    REF 400 LAST 217      07,2333  7 0141 1           MP      MPAC +1
 0322    REF  43 LAST 214      07,2334  54 001 1           TS      L
 0323    REF  74 LAST 216      07,2335  3 7665 0           CAF     ZERO
 03235   REF 111 LAST 217      07,2336  50 114 0           INDEX   BUF
 0324    REF  22 LAST 217      07,2337  21'452 1           DAS     GCOMP            (NBD)(DELTAT)     (GYRO PULSES) X 2(+14)

 0325    REF   1               07,2340  1 2176 1           TCF     DRFTSUB2         CHECK MAGNITUDE OF COMPENSATION



 0326    REF   6 LAST 216      07,2341  57'110 0  LASTBIAS XCH     1/PIPADT         NEW 1/PIPADT VALUE SCALED (CS) X 2(+14)
 0327                          07,2342  4 0000 0           COM
 0328    REF 401 LAST 217      07,2343  6 0140 1           AD      MPAC             C(TIME1) AT PIPAI = 0 SCALED 2(+14)
 0329    REF   1               07,2344  1 2263 0           TCF     NBD2



 0340    REF   3 LAST 215      07,2345  3 2233 1  GCOMPZER CAF     LGCOMP            ROUTINE TO ZERO GCOMP BEFORE FIRST
 0341    REF   9 LAST 213      07,2346  56 003 1           XCH     EBANK             CALL TO 1/PIPA
 0342    REF  25 LAST 213      07,2347  54 147 1           TS      MODE

 0343    REF  75 LAST 217      07,2350  3 7665 0           CAF     ZERO
 0344    REF  23 LAST 217      07,2351  55'451 1           TS      GCOMP
 0345    REF  24 LAST 217      07,2352  55'452 1           TS      GCOMP +1
 0346    REF  25 LAST 217      07,2353  55'453 0           TS      GCOMP +2
 0347    REF  26 LAST 217      07,2354  55'454 1           TS      GCOMP +3
 0348    REF  27 LAST 217      07,2355  55'455 0           TS      GCOMP +4
 0349    REF  28 LAST 217      07,2356  55'456 0           TS      GCOMP +5

 0350    REF  26 LAST 217      07,2357  3 0147 0           CA      MODE
 0351    REF  10 LAST 217      07,2360  54 003 0           TS      EBANK
 0352    REF   4 LAST 213      07,2361  1 4076 0           TCF     SWRETURN          RETURN TO CALLER
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L       AOTMARK                                                                      USER'S OWN PAGE NO.   1
 0001   REF   1                   13,2753                  SETLOC ENDIMODS

 0002   REF   2 LAST  28                     E3            EBANK= AOTAZ
 0003                     13,2753  0 0004 0  AOTMARK   INHINT
 0004   REF  20 LAST 207  13,2754  54 075 1            TS      RUPTREG2         BIT14=INFLIGHT  0=NONFLIGHT
 0005   REF   2 LAST 158  13,2755  10 374 0            CCS     MARKSTAT         ARE MARKS BUTTONS IN USE
 0006                     13,2756  0 2760 1            TC      +2               MARKS BUTTONS NOT AVAILABLE
 0007   REF   1           13,2757  0 2763 1            TC      MKVAC            FIND A VAC AREA
 0008   REF  11 LAST 197  13,2760  0 5413 1            TC      ALARM
 0009                     13,2761   00105 0            OCT     00105
 0010   REF   5 LAST 216  13,2762  0 4440 0            TC      ENDOFJOB

 0011   REF   4 LAST 159  13,2763  10 431 0  MKVAC     CCS     VAC1USE
 0012   REF   1           13,2764  0 2777 1            TC      MKVACFND
 0013   REF   3 LAST 157  13,2765  10 505 0            CCS     VAC2USE
 0014   REF   2 LAST 218  13,2766  0 2777 1            TC      MKVACFND
 0015   REF   3 LAST 157  13,2767  10 561 1            CCS     VAC3USE
 0016   REF   3 LAST 218  13,2770  0 2777 1            TC      MKVACFND
 0017   REF   3 LAST 157  13,2771  10 635 0            CCS     VAC4USE
 0018   REF   4 LAST 218  13,2772  0 2777 1            TC      MKVACFND
 0019   REF   3 LAST 157  13,2773  10 711 1            CCS     VAC5USE
 0020   REF   5 LAST 218  13,2774  0 2777 1            TC      MKVACFND
 0021   REF   7 LAST 207  13,2775  0 5446 1            TC      ABORT            VAC AREAS OCCUPIED
 0022                     13,2776   01207 0            OCT     01207

 0023   REF  22 LAST 214  13,2777  6 7656 0  MKVACFND  AD      TWO
 0024   REF   3 LAST 218  13,3000  54 374 0            TS      MARKSTAT
 0025   REF  76 LAST 217  13,3001  3 7665 0            CAF     ZERO
 0026   REF   1           13,3002  54 375 1            TS      XYMARK           INITIALIZE MARK ID REGISTER
 0027   REF   4 LAST 218  13,3003  50 374 1            INDEX   MARKSTAT
 0028                     13,3004  53 777 0            TS      0 -1             SHOW VAC OCCUPIED

 0029   REF  21 LAST 218  13,3005  3 0075 0            CA      RUPTREG2
 0030   REF   5 LAST 218  13,3006  26 374 0            ADS     MARKSTAT

 0031   REF   1           13,3007  3 4530 0            CAF     PRIO32
 0032   REF   4 LAST 213  13,3010  0 4363 0            TC      NOVAC
 0033                     13,3011   03022 1            2CADR   GETMKS
C0033   REF   1           13,3012   26003 0
 0034   REF  10 LAST 207  13,3013  0 2033 0            TC      MODEEXIT

 0035   REF  77 LAST 218  13,3014  3 7665 0  MKRELEAS  CAF     ZERO
 0036   REF   6 LAST 218  13,3015  56 374 1            XCH     MARKSTAT         SET MARKSTAT  ZERO
 0037   REF 124 LAST 216  13,3016  10 000 0            CCS     A
 0038   REF 125 LAST 218  13,3017  50 000 1            INDEX   A
 0039                     13,3020  54 000 0            TS      0                SHOW VAC AREA AVAILABLE
 0040   REF   5 LAST 217  13,3021  0 4076 1            TC      SWRETURN
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0041   REF  78 LAST 218    13,3022  3 7665 0  GETMKS   CAF    ZERO
0042   REF   2 LAST 218    13,3023  54 375 1           TS     XYMARK
0043   REF  21 LAST 203    13,3024  3 7642 0           CAF    BIT14          FIND IF IN-FLIGHT OR NON-FLIGHT
0044   REF   7 LAST 218    13,3025  7 0374 0           MASK   MARKSTAT
0045   REF 126 LAST 218    13,3026  10 000 0           CCS    A
0046   REF   1             13,3027  0 3036 1           TC     MKVB53         IN-FLIGHT
0047   REF   7 LAST 180    13,3030  4 7645 0           CS     BIT11          NON-FLIGHT, SET Y MARK =1
0048   REF   8 LAST 219    13,3031  7 0374 0           MASK   MARKSTAT
0049   REF   8 LAST 219    13,3032  6 7645 1           AD     BIT11
0050   REF   9 LAST 219    13,3033  54 374 0           TS     MARKSTAT
0051   REF   1             13,3034  3 3355 1           CAF    VB51           REQUEST X MARK
0052                       13,3035  0 3037 0           TC     +2
0053   REF   1             13,3036  3 3431 1  MKVB53   CAF    VB53           REQUEST X AND Y MARKS
0054   REF   1             13,3037  0 5332 0           TC     NVSBWAIT
0055   REF   1             13,3040  0 5274 0           TC     FLASHON
0056   REF   1             13,3041  0 5140 1           TC     ENDIDLE
0057   REF   2 LAST 218    13,3042  0 3023 0           TC     GETMKS +1
0058   REF   3 LAST 219    13,3043  0 3023 0           TC     GETMKS +1

0059   REF  14 LAST 216    13,3044  3 7646 1  MKCHEK   CAF    BIT10          WAS X MARK MADE
0060   REF  10 LAST 219    13,3045  7 0374 0           MASK   MARKSTAT
0061   REF 127 LAST 219    13,3046  10 000 0           CCS    A
0062                       13,3047  0 3051 0           TC     +2             X MARK MADE-LOOK AT Y MARK
0063   REF   1             13,3050  0 3055 1           TC     MKALARM
0064   REF   9 LAST 219    13,3051  3 7645 1           CAF    BIT11
0065   REF  11 LAST 219    13,3052  7 0374 0           MASK   MARKSTAT
0066   REF 128 LAST 219    13,3053  10 000 0           CCS    A
0067   REF   1             13,3054  0 3063 1           TC     GETDET         BOTH MARKS MADE-SHOW ACCEPT-GET DETENT

0068   REF  12 LAST 218    13,3055  0 5413 1  MKALARM  TC     ALARM          IF EITHER MARK IS MISSING AFTER ENTER
0069                       13,3056   00111 0           OCT    111
0070   REF   1             13,3057  4 4516 0           CS     PRIO17         SET BITS 10,11,12,13 TO ZERO IN MARKSTAT
0071   REF  12 LAST 219    13,3060  7 0374 0           MASK   MARKSTAT
0072   REF  13 LAST 219    13,3061  54 374 0           TS     MARKSTAT
0073   REF   4 LAST 219    13,3062  0 3022 1           TC     GETMKS         GETMKS AGAIN

0074   REF   4 LAST 157    13,3063  4 7644 1  GETDET   CS     BIT12
0075   REF  14 LAST 219    13,3064  7 0374 0           MASK   MARKSTAT
0076   REF   5 LAST 219    13,3065  6 7644 0           AD     BIT12          SET BIT12=1 TO SHOW MARKS ACCEPTED
0077   REF  15 LAST 219    13,3066  54 374 0           TS     MARKSTAT
0078   REF   1             13,3067  3 3427 0  DETVB21  CAF    V21N43E
0079   REF   2 LAST 219    13,3070  0 5332 0           TC     NVSBWAIT
0080   REF   2 LAST 219    13,3071  0 5140 1           TC     ENDIDLE
0081   REF   1             13,3072  0 3067 0           TC     DETVB21
0082   REF   2 LAST 219    13,3073  0 3067 0           TC     DETVB21

0083   REF   1             13,3074  4 6165 1           CS     OCT3
0084   REF   1             13,3075  7 0375 1           MASK   DETCODE
0085   REF 129 LAST 219    13,3076  10 000 0           CCS    A
0086   REF   3 LAST 219    13,3077  0 3067 0           TC     DETVB21        BAD CODE, REQUEST AGAIN
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L       AOTMARK                                                                              USER'S OWN PAGE NO.   3

 0087                          13,3100  0 3103 0                TC      +3                LOOKS GOOD BUT COULD BE ZERO
 0088                          13,3101  0 3102 1                TC      +1
 0089   REF   4 LAST 219       13,3102  0 3067 0                TC      DETVB21
 0090   REF   2 LAST 219       13,3103  3 6165 0                CAF     OCT3
 0091   REF   2 LAST 219       13,3104  7 0375 1                MASK    DETCODE           SEE IF ZERO
 0092   REF 130 LAST 219       13,3105  10 000 0                CCS     A
 0093                          13,3106  0 3110 1                TC      +2                GOOD CODE-STORE ANGLES
 0094   REF   5 LAST 220       13,3107  0 3067 0                TC      DETVB21           ZERO-BAD CODE-REQUEST AGAIN

 0095   REF   5 LAST 135       13,3110  3 7672 0                CAF     LOW9
 0096   REF  16 LAST 219       13,3111  7 0374 0                MASK    MARKSTAT
 0097   REF   1                13,3112  54 002 1                TS      BASVAC            STORE VAC AREA ADDRESS
 0098   REF   3 LAST 220       13,3113  50 375 0                INDEX   DETCODE
 0099   REF   1                13,3114  3 1465 1                CA      AOTEL -1
 0100   REF   2 LAST 220       13,3115  50 002 0                INDEX   BASVAC
 0101                          13,3116  54 011 0                TS      9D                STORE ELV ANGLE IN VAC +9
 0102   REF   4 LAST 220       13,3117  50 375 0                INDEX   DETCODE
 0103   REF   3 LAST 218       13,3120  3 1462 0                CA      AOTAZ -1
 0104   REF   3 LAST 220       13,3121  50 002 0                INDEX   BASVAC
 0105                          13,3122  54 010 1                TS      8D                STORE AZIMUTH IN VAC +8

 0106   REF  22 LAST 219       13,3123  3 7642 0                CAF     BIT14             IN-FLIGHT OR NON-FLIGHT
 0107   REF  17 LAST 220       13,3124  7 0374 0                MASK    MARKSTAT
 0108   REF 131 LAST 220       13,3125  10 000 0                CCS     A
 0109   REF   1                13,3126  0 3146 1                TC      MKOUT             IN-FLIGHT, NO MORE DATA NEEDED
 0110   REF   1                13,3127  0 3130 0                TC      ROTVB24           NON-FLIGHT, GET ROTATION ANGLES

 0111   REF   1                13,3130  3 3430 0      ROTVB24   CAF     V24N42E           REQUEST RETICLE ROTATION ANGLES
 0112   REF   3 LAST 219       13,3131  0 5332 0                TC      NVSBWAIT
 0113   REF   3 LAST 219       13,3132  0 5140 1                TC      ENDIDLE
 0114   REF   2 LAST 220       13,3133  0 3130 0                TC      ROTVB24
 0115   REF   3 LAST 220       13,3134  0 3130 0                TC      ROTVB24

 0116   REF   6 LAST 220       13,3135  3 7672 0                CAF     LOW9
 0117   REF  18 LAST 220       13,3136  7 0374 0                MASK    MARKSTAT
 0118   REF   4 LAST 220       13,3137  54 002 1                TS      BASVAC
 0119   REF   1                13,3140  3 0336 1                CA      DSPTEM2           YROT
 0120   REF   5 LAST 220       13,3141  50 002 0                INDEX   BASVAC
 0121                          13,3142  54 003 0                TS      3                 STORE Y RETICLE ROT ANGLE IN VAC +3
 0122   REF   2 LAST 220       13,3143  3 0337 0                CA      DSPTEM2 +1        SROT
 0123   REF   6 LAST 220       13,3144  50 002 0                INDEX   BASVAC
 0124                          13,3145  54 005 0                TS      5                 STORE SPIRAL ROT ANGLE VAC +5

 0125   REF   7 LAST 220       13,3146  3 7672 0      MKOUT     CAF     LOW9
 0126   REF  19 LAST 220       13,3147  7 0374 0                MASK    MARKSTAT
 0127   REF  20 LAST 220       13,3150  54 374 0                TS      MARKSTAT          SET HI5 ZERO

 0128                          13,3151  0 0004 0                INHINT
 0129   REF  39 LAST 216       13,3152  3 7657 1                CAF     ONE
 0130   REF  19 LAST 203       13,3153  0 4536 0                TC      WAITLIST
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L       AOTMARK                                                                        USER'S OWN PAGE NO.   4

 0131                         13,3154   03157 1           2CADR  ENDMARKS
C0131   REF    1              13,3155   26003 0
 0132   REF    6 LAST 218     13,3156  0 4440 0           TC     ENDOFJOB

 0133   REF   40 LAST 220     13,3157  3 7657 1  ENDMARKS CAF    ONE
 0134   REF    3 LAST 206     13,3160  1 2667 0           TCF    GOODEND
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L       AOTMARK                                                                              USER'S OWN PAGE NO.   5

 0135   REF   4 LAST 162    13,3161  54 016 1  MARKRUPT TS      BANKRUPT
 0136   REF   3 LAST 189    13,3162  3 0033 1           CA      CDUY              STORE CDU DATA AND TIME IN TEMP
 0137   REF   1             13,3163  54 072 0           TS      RUPTSTOR +2
 0138   REF   6 LAST 189    13,3164  3 0034 0           CA      CDUZ
 0139   REF   2 LAST 222    13,3165  54 074 0           TS      RUPTSTOR +4
 0140   REF   7 LAST 194    13,3166  3 0032 0           CA      CDUX
 0141   REF   3 LAST 222    13,3167  54 076 1           TS      RUPTSTOR +6
 0142                       13,3170  0 0006 1           EXTEND
 0143   REF   1             13,3171  3 0025 0           DCA     TIME2
 0144   REF   4 LAST 222    13,3172  52 071 0           DXCH    RUPTSTOR

 0145   REF 117 LAST 217    13,3173  56 002 0           XCH     Q
 0146   REF   5 LAST 162    13,3174  54 012 0           TS      QRUPT

 0147   REF   1             13,3175  3 3425 1           CAF     OCT34             SEE IF X OR Y MARK OR MKREJECT
 0148                       13,3176  0 0006 1           EXTEND
 0149   REF   1             13,3177  02 016 1           RAND    NAVKEYIN
 0150   REF 132 LAST 220    13,3200  10 000 0           CCS     A
 0151                       13,3201  0 3203 0           TC      +2                ITS A LIVE ONE-CHECK FOR ACCEPT
 0152   REF   1             13,3202  0 3233 0           TC      SOMEKEY           SOME OTHER KEY

 0153   REF   6 LAST 219    13,3203  3 7644 0           CAF     BIT12             HAVE MARKS BEEN ACCEPTED
 0154   REF  21 LAST 220    13,3204  7 0374 0           MASK    MARKSTAT
 0155   REF 133 LAST 222    13,3205  10 000 0           CCS     A
 0156   REF   4 LAST 188    13,3206  0 4606 0           TC      RESUME            MARKS MADE AND ACCEPTED - DO NOTHING

 0157   REF  22 LAST 222    13,3207  10 374 0           CCS     MARKSTAT          ARE MARKS BEING ACCEPTED
 0158   REF   1             13,3210  0 3214 0           TC      FINDKEY
 0159   REF  13 LAST 219    13,3211  0 5413 1           TC      ALARM             MARKS NOT BEING ACCEPTED
 0160                       13,3212   00112 0           OCT     112
 0161   REF   5 LAST 222    13,3213  0 4606 0           TC      RESUME

 0162   REF   6 LAST 196    13,3214  3 7653 0  FINDKEY  CAF     BIT5
 0163                       13,3215  0 0006 1           EXTEND
 0164   REF   2 LAST 222    13,3216  02 016 1           RAND    NAVKEYIN          CHANNEL 16
 0165   REF 134 LAST 222    13,3217  10 000 0           CCS     A
 0166   REF   1             13,3220  0 3361 0           TC      MKREJ             ITS A MARK REJECT
 0167   REF  14 LAST 214    13,3221  3 7654 1           CAF     BIT4
 0168                       13,3222  0 0006 1           EXTEND
 0169   REF   3 LAST 222    13,3223  02 016 1           RAND    NAVKEYIN
 0170   REF 135 LAST 222    13,3224  10 000 0           CCS     A
 0171   REF   1             13,3225  0 3251 1           TC      YMKRUPT           ITS A Y MARK
 0172   REF   2 LAST  76    13,3226  3 7655 0           CAF     BIT3
 0173                       13,3227  0 0006 1           EXTEND
 0174   REF   4 LAST 222    13,3230  02 016 1           RAND    NAVKEYIN
 0175   REF 136 LAST 222    13,3231  10 000 0           CCS     A
 0176   REF   1             13,3232  0 3245 1           TC      XMKRUPT           ITS AN X MARK
 0177   REF   1             13,3233  3 3426 1  SOMEKEY  CAF     OCT140            NOT MARK OR MARK REJECT
 0178                       13,3234  0 0006 1           EXTEND
 0179   REF   5 LAST 222    13,3235  02 016 1           RAND    NAVKEYIN
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0180                       13,3236  0 0006 1            EXTEND
0181                       13,3237  1 3242 1            BZF      +3              IF NO INBITS.

0182  REF   3 LAST 170     13,3240  0 4102 0            TC       POSTJUMP        IF DESCENT BITS.
0183  REF   1              13,3241   22730 0            CADR     DESCBITS

0184  REF  14 LAST 222     13,3242  0 5413 1   +3       TC       ALARM
0185                       13,3243   00113 1            OCT      113
0186  REF   6 LAST 222     13,3244  0 4606 0            TC       RESUME

0187  REF  79 LAST 219     13,3245  3 7665 0  XMKRUPT   CAF      ZERO
0188  REF  19 LAST 203     13,3246  54 065 0            TS       ITEMP1
0189  REF  15 LAST 219     13,3247  3 7646 1            CAF      BIT10
0190                       13,3250  0 3254 1            TC       +4
0191  REF  41 LAST 221     13,3251  3 7657 1  YMKRUPT   CAF      ONE
0192  REF  20 LAST 223     13,3252  54 065 0            TS       ITEMP1
0193  REF  10 LAST 219     13,3253  3 7645 1            CAF      BIT11
0194  REF   3 LAST 219     13,3254  54 375 1            TS       XYMARK          SET MARK ID

0195  REF  23 LAST 222     13,3255  7 0374 0            MASK     MARKSTAT
0196  REF 137 LAST 222     13,3256  10 000 0            CCS      A
0197                       13,3257  0 3261 1            TC       +2              MARK MADE BUT NOT DESIRED
0198  REF   1              13,3260  0 3264 1            TC       VACSTOR         MARK DESIRED AND MADE-STORE CDUS
0199  REF  15 LAST 223     13,3261  0 5413 1            TC       ALARM
0200                       13,3262   00114 0            OCT      114
0201  REF   1              13,3263  0 3315 0            TC       REMARK          RENEW REQUEST

0202  REF   8 LAST 220     13,3264  3 7672 0  VACSTOR   CAF      LOW9            STORE TIME AND CDUS IN VAC AREA
0203  REF  24 LAST 223     13,3265  7 0374 0            MASK     MARKSTAT
0204  REF   8 LAST 203     13,3266  54 066 0            TS       ITEMP2
0205                       13,3267  0 0006 1            EXTEND
0206  REF   5 LAST 222     13,3270  3 0071 1            DCA      RUPTSTOR
0207  REF   9 LAST 223     13,3271  50 066 1            INDEX    ITEMP2
0208                       13,3272  52 001 1            DXCH     0               STORE TIME1 AND TIME2 IN VAC
0209  REF  10 LAST 223     13,3273  3 0066 1            CA       ITEMP2
0210  REF  21 LAST 223     13,3274  26 065 0            ADS      ITEMP1
0211  REF   6 LAST 223     13,3275  3 0072 1            CA       RUPTSTOR +2
0212  REF  22 LAST 223     13,3276  50 065 1            INDEX    ITEMP1
0213                       13,3277  54 002 1            TS       2
0214  REF   7 LAST 223     13,3300  3 0074 1            CA       RUPTSTOR +4
0215  REF  23 LAST 223     13,3301  50 065 1            INDEX    ITEMP1
0216                       13,3302  54 004 1            TS       4
0217  REF   8 LAST 223     13,3303  3 0076 0            CA       RUPTSTOR +6
0218  REF  24 LAST 223     13,3304  50 065 1            INDEX    ITEMP1
0219                       13,3305  54 006 0            TS       6

0220  REF  11 LAST 201     13,3306  3 7643 1            CAF      BIT13
0221  REF   4 LAST 223     13,3307  6 0375 0            AD       XYMARK
0222                       13,3310  4 0000 0            COM
0223  REF  25 LAST 223     13,3311  7 0374 0            MASK     MARKSTAT
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L        AOTMARK                                                                   USER'S OWN PAGE NO.   7

0224   REF   5 LAST 223      13,3312   6 0375 0         AD      XYMARK           SET MARK MADE BIT IN MARKSTAT=1
0225   REF  26 LAST 223      13,3313  54 374 0          TS      MARKSTAT         AND SET BIT13 ZERO TO SHOW MARK
0226   REF   2 LAST 223      13,3314   0 3315 0         TC      REMARK           MADE BEFORE A REJECT - GO REMARK
```

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L       AOTMARK                                                                   USER'S OWN PAGE NO.   8

 0227   REF  80 LAST 223     13,3315  3 7665 0  REMARK   CAF     ZERO
 0228   REF   1              13,3316  54 077 0           TS      MKDEX            MKDEX=0
 0229   REF  11 LAST 223     13,3317  3 7645 1           CAF     BIT11            LOOK A Y MARK
 0230   REF  27 LAST 224     13,3320  7 0374 0           MASK    MARKSTAT
 0231   REF 138 LAST 223     13,3321  10 000 0           CCS     A
 0232                        13,3322  0 3325 0           TC      +3               Y MARK MADE
 0233   REF  15 LAST 215     13,3323  3 7650 0           CAF     BIT8             Y MARK REQUIRED
 0234   REF   2 LAST 225     13,3324  54 077 0           TS      MKDEX

 0235   REF  16 LAST 223     13,3325  3 7646 1           CAF     BIT10            LOOK AT X MARK
 0236   REF  28 LAST 225     13,3326  7 0374 0           MASK    MARKSTAT
 0237   REF 139 LAST 225     13,3327  10 000 0           CCS     A
 0238   REF   1              13,3330  0 3333 1           TC      MKJOB
 0239   REF  10 LAST 179     13,3331  3 7651 1           CAF     BIT7             X MARK REQUIRED
 0240   REF   3 LAST 225     13,3332  26 077 0           ADS     MKDEX

 0241   REF   2 LAST 218     13,3333  3 4530 0  MKJOB    CAF     PRIO32
 0242   REF   5 LAST 218     13,3334  0 4363 0           TC      NOVAC            ENTER JOB TO PASTE VERB
 0243                        13,3335   03343 0           2CADR   CHANGVB
C0243   REF   1              13,3336   26003 0
 0244   REF  11 LAST 149     13,3337  3 0077 1           CA      RUPTREG4
 0245   REF  20 LAST 206     13,3340  50 071 1           INDEX   LOCCTR
 0246   REF 402 LAST 217     13,3341  54 140 0           TS      MPAC
 0247   REF   7 LAST 223     13,3342  0 4606 0           TC      RESUME

 0248   REF 403 LAST 225     13,3343  10 140 0  CHANGVB  CCS     MPAC
 0249   REF   1              13,3344  0 3347 1           TC      SHOWVB
 0250   REF   1              13,3345  3 3432 1           CAF     VB21N30E
 0251   REF   2 LAST 225     13,3346  0 3351 0           TC      SHOWVB +2
 0252   REF   1              13,3347  3 3433 0  SHOWVB   CAF     VB50
 0253   REF 404 LAST 225     13,3350  6 0140 1           AD      MPAC
 0254   REF   1              13,3351  54 107 0           TS      NVTEMP
 0255   REF   2 LAST 157     13,3352  3 0323 0           CA      CADRSTOR         NVSUB CLOBBERS THIS-USE LOC AS TEMP
 0256   REF  42 LAST 206     13,3353  54 150 1           TS      LOC
 0257   REF   1              13,3354  0 5112 0           TC      NVSUB +3
 0258                        13,3355   05100 0  VB51     OCT     5100
 0259   REF  43 LAST 225     13,3356  3 0150 0           CA      LOC              RESTORE CADRSTOR
 0260   REF   3 LAST 225     13,3357  54 323 1           TS      CADRSTOR
 0261   REF   7 LAST 221     13,3360  0 4440 0           TC      ENDOFJOB

 0262   REF  23 LAST 220     13,3361  3 7642 0  MKREJ    CAF     BIT14            IN-FLIGHT OR NON-FLIGHT
 0263   REF  29 LAST 225     13,3362  7 0374 0           MASK    MARKSTAT
 0264   REF 140 LAST 225     13,3363  10 000 0           CCS     A
 0265   REF   1              13,3364  0 3372 1           TC      REJIN            IN-FLIGHT
 0266   REF  17 LAST 225     13,3365  3 7646 1           CAF     BIT10            NON-FLIGHT, SEE IF X MARK MADE
 0267   REF  30 LAST 225     13,3366  7 0374 0           MASK    MARKSTAT
 0268   REF 141 LAST 225     13,3367  10 000 0           CCS     A
 0269   REF   1              13,3370  0 3414 0           TC      REJECT2          XMARK MADE-REJECT IT
 0270   REF   1              13,3371  0 3376 0           TC      REJALARM         X MARK NOT MADE-ALARM-NO MARKS TO REJ
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L       AOTMARK                                                               USER'S OWN PAGE NO.   9

0271    REF   1               13,3372  3 4504 1  REJIN     CAF    PRIO3        WERE IN-FLIGHT MARKS MADE
0272    REF  31 LAST 225      13,3373  7 0374 0            MASK   MARKSTAT
0273    REF 142 LAST 225      13,3374  10 000 0            CCS    A
0274    REF   1               13,3375  0 3401 1            TC     REJECT       MARKS MADE-REJECT ONE
0275    REF  16 LAST 223      13,3376  0 5413 1  REJALARM  TC     ALARM        NO MARKS MADE TO REJECT-GET MARKS
0276                          13,3377   00115 1            OCT    115
0277    REF   2 LAST 225      13,3400  0 3414 0            TC     REJECT2
0278    REF  12 LAST 223      13,3401  4 7643 0  REJECT    CS     BIT13        SHOW MKREJECT AND SEE MARK MADE
0279    REF  32 LAST 226      13,3402  7 0374 0            MASK   MARKSTAT     SINCE LAST REJECT
0280    REF  13 LAST 226      13,3403  6 7643 1            AD     BIT13
0281    REF  33 LAST 226      13,3404  56 374 1            XCH    MARKSTAT
0282    REF  14 LAST 226      13,3405  7 7643 0            MASK   BIT13
0283    REF 143 LAST 226      13,3406  10 000 0            CCS    A
0284    REF   3 LAST 226      13,3407  0 3414 0            TC     REJECT2      ANOTHER REJECT
0285    REF   6 LAST 224      13,3410  4 0375 1            CS     XYMARK       MARK MADE SINCE LAST REJECT-REJECT IT
0286    REF  34 LAST 226      13,3411  7 0374 0            MASK   MARKSTAT
0287    REF  35 LAST 226      13,3412  54 374 0            TS     MARKSTAT
0288    REF   3 LAST 224      13,3413  0 3315 0            TC     REMARK       GO REQUEST MARKS

0289    REF   2 LAST 226      13,3414  4 4504 0  REJECT2   CS     PRIO3        NO MARKS SINCE LAST REJECT SO SET
0290    REF  36 LAST 226      13,3415  7 0374 0            MASK   MARKSTAT     MARKSTAT TO WANT X AND Y MARKS
0291    REF  37 LAST 226      13,3416  56 374 1            XCH    MARKSTAT
0292    REF  24 LAST 225      13,3417  7 7642 1            MASK   BIT14        IN-FLIGHT OR NON-FLIGHT
0293    REF 144 LAST 226      13,3420  10 000 0            CCS    A
0294    REF   4 LAST 226      13,3421  0 3315 0            TC     REMARK       IN-FLIGHT, GO GET MARKS
0295    REF  12 LAST 225      13,3422  3 7645 1            CAF    BIT11        NON-FLIGHT, STILL REQUEST X MARK ONLY
0296    REF  38 LAST 226      13,3423  26 374 0            ADS    MARKSTAT
0297    REF   5 LAST 226      13,3424  0 3315 0            TC     REMARK       GO GET X MARK

0298    REF   3 LAST 203                   6165  OCT3      EQUALS THREE
0299                          13,3425   00034 0  OCT34     OCT    00034
0300                          13,3426   00140 1  OCT140    OCT    00140
0301                          13,3427   02143 0  V21N43E   OCT    2143
0302                          13,3430   02442 1  V24N42E   OCT    2442
0303                          13,3431   05300 1  VB53      OCT    5300
0304    REF  12 LAST 225                   0077  MKDEX     EQUALS RUPTREG4
0305    REF   7 LAST 226                   0375  DETCODE   EQUALS XYMARK
0306    REF 118 LAST 222                   0002  BASVAC    EQUALS Q
0307                          13,3432   02130 1  VB21N30E  OCT    2130
0308                          13,3433   05000 1  VB50      OCT    5000
0309                                    13,3434  ENDAMODS  EQUALS
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L0001   RADAR LEAD-IN ROUTINES                                                          USER'S OWN PAGE NO.   1

 0001   REF   1                        4763              SETLOC ENDIMODF
 0002   REF   1                          E3              EBANK= RRRET

R0003             THE FOLLOWING SUBROUTINE RETURNS TO CALLER + 2 IF THE ABSOLUTE VALUE OF C(A) IS GREATER THAN THE
R0005   NEGATIVE OF THE NUMBER AT CALLER +1. OTHERWISE IT RETURNS TO CALLER +3. MAY BE CALLED IN RUPT OR UNDER EXEC.

 0007                         4763  0 0006 1  MAGSUB   EXTEND
 0008                         4764  6 4766 1           BZMF    +2
 0009                         4765  1 4767 1           TCF     +2
 0010                         4766  4 0000 0           COM

 0011   REF 119 LAST 226      4767  50 002 0           INDEX   Q
 0012                         4770  6 0000 1           AD      0
 0013                         4771  0 0006 1           EXTEND
 0014                         4772  6 4775 0           BZMF    +3
 0015   REF 120 LAST 227      4773  50 002 0           INDEX   Q                 ABS(A) G CONST
 0016                         4774  0 0001 0           TC      1

 0017   REF 121 LAST 227      4775  50 002 0  MAGLESS  INDEX   Q                 ABS(A) LEQ CONST
 0018                         4776  0 0002 0           TC      2
```

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L0001   RADAR LEAD-IN ROUTINES                                                    USER'S OWN PAGE NO.   2

P0019             THE FOLLOWING SUBROUTINE CHECKS RR GIMBAL ANGLES TO SEE IF THEY ARE IN THE LIMITS OF THE CURRENT MODE.
R0021   CALLING SEQUENCE IS AS FOLLOWS:

A0022                                                    TC      RRLIMCHK        (WITH INTERRUPT INHIBITED).
A0023                                                    ADRES   T,S             (IN UNSWITCHED E OR CURRENT EBANK).

R0024             RETURN IS TO CALLER +2 IF NOT IN LIMITS AND TO CALLER +3 IF SO.

 0025   REF 122 LAST 227         4777  50 002 0  RRLIMCHK INDEX   Q               READ GIMBAL ANGLES INTO ITEMP STORAGE.
 0026                            5000  3 0000 1           CAF     0
 0027   REF 123 LAST 228         5001  24 002 0           INCR    Q
 0028                            5002  0 0006 1           EXTEND
 0029   REF 145 LAST 226         5003  5 0000 1           INDEX   A
 0030                            5004  3 0001 0           DCA     0
 0031   REF  25 LAST 223         5005  52 066 0           DXCH    ITEMP1
 0032   REF 124 LAST 228         5006  22 002 0           LXCH    Q               L(CALLER +2) TO L.

 0033   REF   7 LAST 222         5007  3 7644 0           CAF     BIT12           SEE WHICH MODE RR IS IN.
 0034   REF  14 LAST 180         5010  7 0413 0           MASK    RADMODES
 0035   REF 146 LAST 228         5011  10 000 0           CCS     A
 0036   REF   1                  5012  1 5025 1           TCF     MODE2CHK

 0037   REF  26 LAST 228         5013  3 0065 1           CA      ITEMP1          MODE 1 IS DEFINED AS
 0038   REF   1                  5014  0 4763 1           TC      MAGSUB               1. ABS(T) L 70 DEGS.
 0039                            5015   66161 1           DEC     -.30555              2. ABS(S + 5.5 DEGS) L 64.5 DEGS
 0040   REF  44 LAST 217         5016  0 0001 0           TC      L                         (SHAFT LIMITS AT +59, -70 DEGS)

 0041   REF   1                  5017  3 5037 0           CAF     5.5DEGS
 0042   REF  11 LAST 223         5020  6 0066 1           AD      ITEMP2          S
 0043   REF   2 LAST 228         5021  0 4763 1           TC      MAGSUB
 0044                            5022   64420 0           DEC     -.35833         64.5 DEGS
 0045   REF  45 LAST 228         5023  0 0001 0           TC      L
 0046   REF   1                  5024  0 5035 1           TC      RRLIMOK         IN LIMITS.

 0047   REF   1                  5025  3 5041 1  MODE2CHK CAF     82DEGS          MODE 2 IS DEFINED AS
 0048   REF  12 LAST 228         5026  6 0066 1           AD      ITEMP2               1. ABS(T) G 110 DEGS
 0049   REF   3 LAST 228         5027  0 4763 1           TC      MAGSUB               2. ABS(S + 82 DEGS) L 57 DEGS
 0050                            5030   65673 0           DEC     -.31667                   (SHAFT LIMITS AT -25, -139 DEGS)
 0051   REF  46 LAST 228         5031  0 0001 0           TC      L

 0052   REF  27 LAST 228         5032  3 0065 1           CA      ITEMP1
 0053   REF   4 LAST 228         5033  0 4763 1           TC      MAGSUB
 0054                            5034   54343 1           DEC     -.61111         110 DEGS

 0055   REF  47 LAST 228         5035  50 001 0  RRLIMOK  INDEX   L
 0056   REF  48 LAST 228         5036  0 0001 0           TC      L               ( = TC 1)

 00565                           5037   00765 0  5.5DEGS  DEC     .03056
 0057                            5040   00707 1  5DEGS    DEC     .02777          SCALED IN HALF-REVOLUTIONS.
 0058                            5041   16450 1  82DEGS   DEC     .45556
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L0001   RADAR LEAD-IN ROUTINES                                                            USER'S OWN PAGE NO.   3

P0059            THE FOLLOWING ROUTINE UPDATES THE TRACKER FAIL LAMP ON THE DSKY. IF EITHER:

R0061            1. N SAMPLES OF RR DATA COULD NOT BE OBTAINED FROM 2N TRIES
R0062            2. N SAMPLES OF LR DATA COULD NOT BE TAKEN IN 2N TRIES WITH EITHER THE ALT OR VEL INFORMATION.
R0064            3. RR CDU FAILED WITH RR IN AUTO MODE AND RR CDU NOT BEING ZEROED.

 0066   REF  12 LAST 205          5042  3 7657 1  SETTRKF  CAF     BIT1               NO ACTION IF DURING LAMP TEST.
 0067   REF   9 LAST 200          5043  7 0370 1           MASK    IMODES33
 0068   REF 147 LAST 228          5044  10 000 0           CCS     A
 0069   REF 125 LAST 228          5045  0 0002 0           TC      Q

 0070   REF   1                   5046  3 5076 0           CAF     13,7,2             SEE IF CDU FAILED.
 0071   REF  15 LAST 228          5047  7 0413 0           MASK    RADMODES
 0072                             5050  0 0006 1           EXTEND
 0073   REF   1                   5051  1 5061 1           BZF     TRKFLON            CONDITION 3 ABOVE.

 0074   REF  16 LAST 229          5052  4 0413 0           CS      RADMODES           SEE IF LR FAILED.
 0075   REF   1                   5053  7 5077 0           MASK    8,5
 0076                             5054  0 0006 1           EXTEND
 0077   REF   2 LAST 229          5055  1 5061 1           BZF     TRKFLON            CONDITION 2 ABOVE.

 0078   REF  15 LAST 222          5056  3 7654 1           CAF     BIT4               SEE IF RR DATA FAILED.
 0079   REF  17 LAST 229          5057  7 0413 0           MASK    RADMODES
 0080   REF 148 LAST 229          5060  10 000 0           CCS     A
 0081   REF  16 LAST 225          5061  3 7650 0  TRKFLON  CAF     BIT8
 0082   REF  16 LAST 172          5062  6 0322 1           AD      DSPTAB +11D        HALF ADD DESIRED AND PRESENT STATES.
 0083   REF  17 LAST 229          5063  7 7650 1           MASK    BIT8
 0084                             5064  0 0006 1           EXTEND
 0085   REF   2 LAST 150          5065  1 4712 0           BZF     TCQ                NO CHANGE.

 0086   REF  49 LAST 228          5066  54 001 1           TS      L                  INVERT BIT 8 AND SET BIT 15.
 0087   REF  17 LAST 229          5067  3 0322 1           CA      DSPTAB +11D        CANT USE LXCH DSPTAB +11D (RESTART PROB)
 0088                             5070  0 0006 1           EXTEND
 0089   REF  50 LAST 229          5071  06 001 0           RXOR    L
 0090   REF  19 LAST 216          5072  7 7637 0           MASK    POSMAX
 0091   REF  14 LAST 173          5073  6 7641 0           AD      BIT15
 0092   REF  18 LAST 229          5074  54 322 0           TS      DSPTAB +11D
 0093   REF 126 LAST 229          5075  0 0002 0           TC      Q

 0094                             5076   10102 0  13,7,2   OCT     10102
 0095                             5077   00220 1  8,5      OCT     00220

 0096                                      5100  ENDRMODF EQUALS
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L0001   RADAR LEAD-IN ROUTINES                                                    USER'S OWN PAGE NO.   4

P0097           TURNON SEQUENCE TO ZERO THE CDUS AND DETERMINE THE RR MODE.

 0098                                10,2000            BANK     10

 0099   REF   1             10,2000  0 2013 1  RRTURNON TC       RRZEROSB
 0100   REF   2 LAST 193    10,2001  0 4554 1           TC       FIXDELAY         WAIT 1 SEC BEFORE REMOVING TURN ON FLAG
 0101                       10,2002   00144 0           DEC      100              SO A MONITOR REPOSITION WONT ALARM.
 0102   REF  13 LAST 229    10,2003  4 7657 0           CS       BIT1
 0103   REF  18 LAST 229    10,2004  7 0413 0           MASK     RADMODES
 0104   REF  19 LAST 230    10,2005  54 413 0           TS       RADMODES
 0105   REF  14 LAST 190    10,2006  4 0061 1           CS       STATE            SEE IF SOMEONE IS WAITING TO USE THE RR.
 0106   REF   1             10,2007  7 7651 0           MASK     RRUSEFLG
 0107   REF 149 LAST 229    10,2010  10 000 0           CCS      A
 0108   REF  17 LAST 206    10,2011  1 4602 0           TCF      TASKOVER

 0109   REF   1             10,2012  1 3235 1           TCF      ENDRADAR         CHECK RR CDU FAIL BEFORE EXIT.
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L0001   RADAR LEAD-IN ROUTINES                                                              USER'S OWN PAGE NO.   5

P0110            CLOSED SUBROUTINE TO ZERO THE RR CDUS.

 0111                          10,2013   0 0006 1  RRZEROSB EXTEND
 0112   REF   2 LAST 227       10,2014  23'460 1            QXCH    RRRET
 0113   REF  14 LAST 230       10,2015   3 7657 1           CAF     BIT1               BIT 13 OF RADMODES MUST BE SET BEFORE
 0114                          10,2016   0 0006 1           EXTEND                     COMING HERE.
 0115                          10,2017  05 012 1            WOR     12
 0116   REF   3 LAST 230       10,2020   0 4554 1           TC      FIXDELAY
 0117                          10,2021    00002 0           DEC     2

 0118   REF  81 LAST 225       10,2022   3 7665 0           CAF     ZERO
 0119   REF   2 LAST 180       10,2023  54 035 0            TS      OPTY
 0120   REF   1                10,2024  54 036 0            TS      OPTX
 0121   REF  42 LAST 223       10,2025   4 7657 0           CS      ONE                REMOVE ZEROING BIT.
 0122                          10,2026   0 0006 1           EXTEND
 0123                          10,2027  03 012 1            WAND    12
 0124   REF   4 LAST 231       10,2030   0 4554 1           TC      FIXDELAY
 0125                          10,2031    00454 1           DEC     300

 0126   REF  15 LAST 226       10,2032   4 7643 0           CS      BIT13              REMOVE ZEROING IN PROCESS BIT.
 0127   REF  20 LAST 230       10,2033   7 0413 0           MASK    RADMODES
 0128   REF  21 LAST 231       10,2034  54 413 0            TS      RADMODES

 0129   REF   3 LAST 231       10,2035   3 0035 1           CA      OPTY
 0130   REF   5 LAST 228       10,2036   0 4763 1           TC      MAGSUB
 0131                          10,2037    57777 1           DEC     -.5
 0132                          10,2040   1 2043 0           TCF     +3                 IF MODE 2.

 0133   REF  82 LAST 231       10,2041   3 7665 0           CAF     ZERO
 0134                          10,2042   1 2044 1           TCF     +2
 0135   REF   8 LAST 228       10,2043   3 7644 0           CAF     BIT12
 0136   REF  22 LAST 231       10,2044  56 413 1            XCH     RADMODES
 0137   REF   1                10,2045   7 4360 1           MASK    -BIT12
 0138   REF  23 LAST 231       10,2046  26 413 0            ADS     RADMODES

 0139   REF   2 LAST 179       10,2047   0 5042 1           TC      SETTRKF            TRACKER LAMP MIGHT GO ON NOW.

 0140   REF   3 LAST 231       10,2050   0 1460 1           TC      RRRET              DONE.

 0141   REF   2 LAST 124                      4360   -BIT12  EQUALS  -1/8               IN SPROOT
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L0001   RADAR LEAD-IN ROUTINES                                                           USER'S OWN PAGE NO.  6

P0142             SEQUENCE OF TASKS TO DRIVE THE RR TO A SAFE POSITION.

 0143   REF   1             10,2051  0 2106 1  DORREPOS TC        SETRRECR        SET UP RR CDU ERROR COUNTERS.

 0144   REF  15 LAST 231    10,2052  3 7657 1           CAF       BIT1            DO AN ALARM UNLESS RR JUST TURNED ON.
 0145   REF  24 LAST 231    10,2053  7 0413 0           MASK      RADMODES
 0146   REF 150 LAST 230    10,2054  10 000 0           CCS       A
 0147                       10,2055  1 2060 1           TCF       +3

 0148   REF  17 LAST 226    10,2056  0 5413 1           TC        ALARM
 0149                       10,2057   00501 0           OCT       501
 0150   REF   5 LAST 231    10,2060  0 4554 1           TC        FIXDELAY
 0151                       10,2061   00002 0           DEC       2

 0152   REF   9 LAST 231    10,2062  3 7644 0           CAF       BIT12           MANEUVER TRUNNION ANGLE TO NOMINAL POS.
 0153   REF  25 LAST 232    10,2063  7 0413 0           MASK      RADMODES
 0154   REF 151 LAST 232    10,2064  10 000 0           CCS       A
 0155   REF  15 LAST 229    10,2065  3 7641 0           CAF       BIT15           0 FOR MODE 1 AND 180 FOR MODE 2.
 0156   REF   1             10,2066  0 2150 1           TC        RRTONLY

 0157   REF  10 LAST 232    10,2067  3 7644 0           CAF       BIT12           NOW PUT SHAFT IN RIGHT POSITION.
 0158   REF  26 LAST 232    10,2070  7 0413 0           MASK      RADMODES
 0159   REF 152 LAST 232    10,2071  10 000 0           CCS       A
 0160   REF  16 LAST 149    10,2072  4 7642 1           CS        HALF            -90 FOR MODE 2.
 0161   REF   1             10,2073  0 2153 1           TC        RRSONLY

 0162   REF  13 LAST 226    10,2074  4 7645 0  REPOSRPT CS        BIT11           RETURNS HERE FROM RR1AXIS IF REMODE
A0163                                                                             REQUESTED DURING REPOSITION.
 0164   REF  27 LAST 232    10,2075  7 0413 0           MASK      RADMODES        REMOVE REPOSITION BIT.
 0165   REF  28 LAST 232    10,2076  54 413 0           TS        RADMODES
 0166   REF  18 LAST 225    10,2077  7 7646 0           MASK      BIT10           SEE IF SOMEONE IS WAITING TO DESIGNATE.
 0167   REF 153 LAST 232    10,2100  10 000 0           CCS       A
 0168   REF   1             10,2101  1 2422 0           TCF       BEGDES
 0169   REF  17 LAST 200    10,2102  4 7656 1           CS        BIT2            IF NO FURTHER ANTENNA CONTROL REQUIRED,
 0170                       10,2103  0 0006 1           EXTEND                    REMOVE ERROR COUNTER ENABLE.
 0171                       10,2104  03 012 1           WAND      12
 0172   REF  18 LAST 230    10,2105  1 4602 0           TCF       TASKOVER

 0173   REF  18 LAST 232    10,2106  3 7656 0  SETRRECR CAF       BIT2            SET UP RR ERROR COUNTERS.
 0174                       10,2107  0 0006 1           EXTEND
 0175                       10,2110  05 012 1           WOR       12

 0176   REF  83 LAST 231    10,2111  3 7665 0           CAF       ZERO
 0177   REF   4 LAST 166    10,2112  54 362 1           TS        LASTYCMD
 0178   REF   4 LAST 166    10,2113  54 363 0           TS        LASTXCMD
 0179   REF 127 LAST 229    10,2114  0 0002 0           TC        Q
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L0001   RADAR LEAD-IN ROUTINES                                                              USER'S OWN PAGE NO.   7

P0180             GENERAL REMODING SUBROUTINE. DRIVES TRUNION TO 0 (180), THEN DRIVES SHAFT TO -45, AND FINALLY DRIVES
R0182   TRUNNION TO -130 (-50) BEFORE INITIATING 2-AXIS CONTROL. ALL RE-MODING DONE WITH SINGLE AXIS ROTATIONS (RR1AXIS)
 0184   REF  11 LAST 232      10,2115  3 7644 0  REMODE    CAF      BIT12             DRIVE TRUNNION TO 0 (180).
 0185   REF  29 LAST 232      10,2116  7 0413 0            MASK     RADMODES          (ERROR COUNTER ALREADY ENABLED)
 0186   REF 154 LAST 232      10,2117  10 000 0            CCS      A
 0187   REF  16 LAST 232      10,2120  3 7641 0            CAF      BIT15
 0188   REF   2 LAST 232      10,2121  0 2150 1            TC       RRTONLY

 0189   REF   1               10,2122  3 2137 0            CAF      -45DEGSR
 0190   REF   2 LAST 232      10,2123  0 2153 1            TC       RRSONLY

 0191   REF  30 LAST 233      10,2124  4 0413 0            CS       RADMODES
 0192   REF  12 LAST 233      10,2125  7 7644 1            MASK     BIT12
 0193   REF 155 LAST 233      10,2126  10 000 0            CCS      A
 0194   REF   1               10,2127  3 2141 1            CAF      -80DEGSR          GO TO T = -130 (-50).
 0195   REF   2 LAST 233      10,2130  6 2141 1            AD       -80DEGSR
 0196   REF   3 LAST 233      10,2131  0 2150 1            TC       RRTONLY

 0197   REF   1               10,2132  0 2142 1            TC       RMODINV

 0198   REF  25 LAST 226      10,2133  4 7642 1            CS       BIT14             END OF REMODE.
 0199   REF  31 LAST 233      10,2134  7 0413 0            MASK     RADMODES
 0200   REF  32 LAST 233      10,2135  54 413 0            TS       RADMODES

 0201   REF   1               10,2136  0 2431 0            TC       STDESIG           BEGIN 2-AXIS CONTROL.

 0202                         10,2137    70000 0  -45DEGSR OCT      70000
 02025                        10,2140    67070 1  -50DEGSR DEC      -.27778
 0203                         10,2141    61615 1  -80DEGSR DEC      -.44444

 0204   REF  33 LAST 233      10,2142  22 413 1  RMODINV   LXCH     RADMODES          INVERT THE MODE STATUS.
 0205   REF  13 LAST 233      10,2143  3 7644 0            CAF      BIT12
 0206                         10,2144  0 0006 1            EXTEND
 0207   REF  51 LAST 229      10,2145  06 001 0            RXOR     L
 0208   REF  34 LAST 233      10,2146  54 413 0            TS       RADMODES
 0209   REF 128 LAST 232      10,2147  0 0002 0            TC       Q
```

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P0210             SUBROUTINES FOR DOING SINGLE AXIS RR MANEUVERS FOR REMODE AND REPOSITION. DRIVES TO WITHIN 1 DEGREE.

 0212   REF   1             10,2150  55'461 1  RRTONLY  TS      RDES          DESIRED TRUNION ANGLE.
 0213   REF  84 LAST 232    10,2151  3 7665 0           CAF     ZERO
 0214   REF   1             10,2152  1 2155 0           TCF     RR1AXIS

 0215   REF   2 LAST 234    10,2153  55'461 1  RRSONLY  TS      RDES          SHAFT COMMANDS ARE UNRESOLVED SINCE THIS
 0216   REF  43 LAST 231    10,2154  3 7657 1           CAF     ONE           ROUTINE ENTERED ONLY WHEN T = 0 OR 180.

 0217   REF   1             10,2155  55'462 1  RR1AXIS  TS      RRINDEX
 0218                       10,2156  0 0006 1           EXTEND
 0219   REF   4 LAST 231    10,2157  23'460 1           QXCH    RRRET
 0220   REF   1             10,2160  1 2163 0           TCF     RR1AX2

 0221   REF   6 LAST 232    10,2161  0 4554 1  NXTRR1AX TC      FIXDELAY
 0222                       10,2162   00062 0           DEC     50            2 SAMPLES PER SECOND.

 0223   REF  35 LAST 233    10,2163  4 0413 0  RR1AX2   CS      RADMODES      IF SOMEONE REQUESTES AS DESIGNATE WHICH
 0224   REF   1             10,2164  7 4520 0           MASK    PRIO22        REQUIRES A REMODE AND A REPOSITION IS IN
 0225                       10,2165  0 0006 1           EXTEND                PROGRESS, INTERRUPT IT AND START THE
 0226   REF   1             10,2166  1 2074 1           BZF     REPOSRPT      REMODE IMMEDIATELY.

 0227   REF   3 LAST 234    10,2167  3 1461 0           CA      RDES
 0228                       10,2170  0 0006 1           EXTEND
 0229   REF   2 LAST 234    10,2171  5 1462 0           INDEX   RRINDEX
 0230   REF   4 LAST 231    10,2172  20 035 0           MSU     OPTY
 0231   REF 129 LAST 233    10,2173  54 002 1           TS      Q             SAVE ERROR SIGNAL.
 0232                       10,2174  0 0006 1           EXTEND
 0233   REF   1             10,2175  7 2212 0           MP      RRSPGAIN      TRIES TO NULL .7 OF ERROR OVER NEXT .5
 0234   REF  52 LAST 233    10,2176  54 001 1           TS      L
 0235   REF 130 LAST 234    10,2177  3 0002 0           CA      Q             SEE IF WITHIN 1 DEGREE.
 0236   REF   6 LAST 231    10,2200  0 4763 1           TC      MAGSUB
 0237                       10,2201   77644 1           DEC     -.00555       SCALED IN HALF-REVS.

 0238                       10,2202  1 2204 1           TCF     +2            NO.
 0239   REF   5 LAST 234    10,2203  0 1460 1           TC      RRRET         RETURN TO CALLER.

 0240   REF   3 LAST 234    10,2204  11'462 1           CCS     RRINDEX       COMMAND FOR OTHER AXIS IS ZERO.
 0241                       10,2205  1 2207 1           TCF     +2            SETTING A TO 0.
 0242   REF  53 LAST 234    10,2206  56 001 0           XCH     L
 0243   REF   2 LAST  16    10,2207  52 424 1           DXCH    TANG

 0244   REF   1             10,2210  0 2213 0           TC      RROUT

 0245   REF   1             10,2211  1 2161 1           TCF     NXTRR1AX      COME BACK IN .5 SECONDS.

 0246                       10,2212   22715 1  RRSPGAIN DEC     .59062        NULL .7 ERROR IN .5 SEC.
```

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L0001   RADAR LEAD-IN ROUTINES                                                              USER'S OWN PAGE NO.   9

P0247           THE FOLLOWING ROUTINE RECEIVES RR GYRO COMMANDS IN TANG,+1 IN ERROR COUNTER SCALING. RROUT LIMITS THEM
R0249   AND GENERATES COMMANDS TO THE CDU TO ADJUST THE ERROR COUNTERS TO THE DESIRED VALUES. RUPT MUST BE INHIBITED.

 0251   REF 131 LAST 234     10,2213  22 002 0  RROUT     LXCH    Q                  SAVE RETURN.
 0252   REF  44 LAST 234     10,2214  3 7657 1            CAF     ONE                LOOP TWICE.
 0253   REF  13 LAST 228     10,2215  54 066 0  RROUT2    TS      ITEMP2
 0254   REF 156 LAST 233     10,2216  50 000 1            INDEX   A
 0255   REF   3 LAST 234     10,2217  3 0423 1            CA      TANG
 0256   REF  28 LAST 228     10,2220  54 065 0            TS      ITEMP1             SAVE SIGN OF COMMAND FOR LIMITING.

 0257   REF   7 LAST 234     10,2221  0 4763 1            TC      MAGSUB             SEE IF WITHIN LMITS.
 0258                        10,2222   77177 0  -RRLIMIT DEC     -384
 0259   REF   1              10,2223  1 2241 0            TCF     RROUTLIM           LIMIT COMMAND TO MAG OF 384.

 0260   REF  29 LAST 235     10,2224  3 0065 1  SETRRCTR CA      ITEMP1             COUNT OUT DIFFERENCE BETWEEN DESIRED
 0261   REF  14 LAST 235     10,2225  50 066 1            INDEX   ITEMP2             STATE AND PRESENT STATE AS RECORDED IN
 0262   REF   5 LAST 232     10,2226  56 362 0            XCH     LASTYCMD           LASTYCMD AND LASTXCMD
 0263                        10,2227  4 0000 0            COM
 0264   REF  30 LAST 235     10,2230  6 0065 1            AD      ITEMP1
 0265   REF  15 LAST 235     10,2231  50 066 1            INDEX   ITEMP2
 0266   REF   2 LAST 166     10,2232  54 053 0            TS      OPTYCMD

 0267   REF  16 LAST 235     10,2233  10 066 0            CCS     ITEMP2             PROCESS BOTH INPUTS.
 0268   REF   1              10,2234  1 2215 1            TCF     RROUT2

 0269   REF   1              10,2235  3 4506 0            CAF     PRIO6              ENABLE COUNTERS.
 0270                        10,2236  0 0006 1            EXTEND
 0271                        10,2237  05 014 1            WOR     14

 0272   REF  54 LAST 234     10,2240  0 0001 0            TC      L                  RETURN.

 0273   REF  31 LAST 235     10,2241  10 065 0  RROUTLIM CCS     ITEMP1             LIMIT COMMAND TO ABS VAL OF 384.
 0274   REF   1              10,2242  4 2222 0            CS      -RRLIMIT
 0275                        10,2243  1 2245 1            TCF     +2
 0276   REF   2 LAST 235     10,2244  3 2222 1            CA      -RRLIMIT
 0277   REF  32 LAST 235     10,2245  54 065 0            TS      ITEMP1
 0278   REF   1              10,2246  1 2225 1            TCF     SETRRCTR +1
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L0001   RADAR LEAD-IN ROUTINES                                                              USER'S OWN PAGE NO.  10

P0279             ROUTINE TO ZERO THE RR CDUS AND DETERMINE THE ANTENNA MODE.

 0280                         10,2247  0 0004 0  RRZERO    INHINT
 0281   REF   2 LAST 230      10,2250  4 7651 0            CS       RRUSEFLG              SET FLAG TO SHOW SOMEONE USING THE RR.
 0282   REF  15 LAST 230      10,2251  7 0061 1            MASK     STATE
 0283   REF   3 LAST 236      10,2252  6 7651 1            AD       RRUSEFLG
 0284   REF  16 LAST 236      10,2253  54 061 1            TS       STATE

 0285   REF  16 LAST 232      10,2254  3 7657 1            CAF      BIT1                  SEE IF RR COMING UP. IF SO, TURNON
 0286   REF  36 LAST 234      10,2255  7 0413 0            MASK     RADMODES              PROGRAM WILL DO THE WORK.
 0287   REF 157 LAST 235      10,2256  10 000 0            CCS      A
 0288   REF   1               10,2257  1 2302 0            TCF      ROADBACK

 0289   REF  14 LAST 232      10,2260  3 7645 1            CAF      BIT11                 SEE IF MONITOR REPOSITION IN PROGRESS.
 0290   REF  37 LAST 236      10,2261  7 0413 0            MASK     RADMODES              IF SO, DONT RE-ZERO CDUS.
 0291   REF 158 LAST 236      10,2262  10 000 0            CCS      A
 0292   REF   1               10,2263  1 3227 1            TCF      RADNOOP               (IMMEDIATE TASK TO RGOODEND).

 0293   REF  16 LAST 231      10,2264  4 7643 0            CS       BIT13                 SET FLAG TO SHOW ZEROING IN PROGRESS.
 0294   REF  38 LAST 236      10,2265  7 0413 0            MASK     RADMODES
 0295   REF  17 LAST 236      10,2266  6 7643 1            AD       BIT13
 0296   REF  39 LAST 236      10,2267  54 413 0            TS       RADMODES

 0297   REF  45 LAST 235      10,2270  3 7657 1            CAF      ONE
 0298   REF  20 LAST 220      10,2271  0 4536 0            TC       WAITLIST
 0299                         10,2272    02304 1           2CADR    RRZ2
C0299   REF   1               10,2273    20003 0
 0300   REF  40 LAST 236      10,2274  4 0413 0            CS       RADMODES              SEE IF IN AUTO MODE.
 0301   REF  19 LAST 232      10,2275  7 7656 1            MASK     BIT2
 0302   REF 159 LAST 236      10,2276  10 000 0            CCS      A
 0303   REF   2 LAST 236      10,2277  1 2302 0            TCF      ROADBACK
 0304   REF  18 LAST 232      10,2300  0 5413 1            TC       ALARM                 AUTO DISCRETE NOT PRESENT - TRYING
 0305                         10,2301    00510 0           OCT      510
 0306                         10,2302  0 0003 1  ROADBACK  RELINT
 0307   REF   6 LAST 218      10,2303  1 4076 0            TCF      SWRETURN

 0308   REF   2 LAST 230      10,2304  0 2013 1  RRZ2      TC       RRZEROSB              COMMON TO TURNON AND RRZERO.
 0309   REF   2 LAST 230      10,2305  1 3235 1            TCF      ENDRADAR

 0310   REF  11 LAST 225                  7651   RRUSEFLG  EQUALS   BIT7
 0311   REF   7 LAST 222                  7653   LOKONFLG  EQUALS   BIT5
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P0312             STABLE-MEMBER RR DESIGNATE ROUTINE. DESIGNATE TO A SM LOS VECTOR (HALF-UNIT) IN RRTARGET. REMODES IF
R0314   REQUIRED. RETURNS TO CALLER IF MANEUVER REQUIRED FOR DES AND SKIPS IF IT CAN BE DONE IN PRESENT VEH ATTITUDE.

 0316                          10,2306   43030 0  RRDESSM  STQ     CLEAR
 0317   REF    2 LAST  16      10,2307   00427 0                   DESRET
 0318   REF    1               10,2310   00271 0                   RRNBSW
 0319                          10,2311   66224 0           RTB     SSP             READ CDUS FOR SMNB.
 0320   REF    1               10,2312   33361 0                   READCDUS
 0321   REF    2 LAST 117      10,2313   00051 0                   S1
 0322                          10,2314   00024 1                   20D
 0323                          10,2315   22025 0           STOVL   20D
 0324   REF    1               10,2316   00416 1                   RRTARGET
 0325                          10,2317   36041 1           STCALL  32D
 0326   REF    1               10,2320   32473 0                   SMNB

 0327                          10,2321   77634 0           CALL                    GET RR GIMBAL ANGLES IN PRESENT AND
 0328   REF    1               10,2322   33267 1                   RRANGLES        ALTERNATE MODE.
 0329                          10,2323   77776 1           EXIT

 0330                          10,2324  0 0004 0           INHINT
 0331   REF    2 LAST 180      10,2325  0 4777 1           TC      RRLIMCHK
 0332   REF    1               10,2326   00423 1           ADRES   MODEA           CONFIGURATION FOR CURRENT MODE.
 0333   REF    1               10,2327  1 2351 0           TCF     TRYSWS

 0334   REF    3 LAST 237      10,2330  24 427 0  OKDESSM  INCR    DESRET          INCREMENT SAYS NO VEHICLE MANEUVER REQ.
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L0001    RADAR LEAD-IN ROUTINES                                                          USER'S OWN PAGE NO.  12

P0335             AT THIS POINT WE ARE READY TO BEGIN DESIGNATION. THE TARGET IS STORED AS A HALF-UNIT VECTOR IN RRTARGET
R0337    WITH RRNBSW SET IF IT IS REFERRED TO NAV BASE AXES. LOKONSW IS SET IF LOCKON IS DESIRED. BIT14 OF RADMODES IS
R0339    SET IF A REMODE IS REQUIRED. AT THIS TIME, THE ANTENNA MAY BE IN A MONITOR REPOSITION OPERATION. IN THIS
R0341    CASE, IF A REMODE IS REQUIRED IT MAY HAVE ALREADY BEGUN BUT IT ANY CASE THE REPOSITION WILL BE INTERRUPTED.
R0343    OTHERWISE, THE REPOSITION WILL BE COMPLETED BEFORE 2-AXIS DESIGNATION BEGINS.

 0345    REF   1                 10,2331   3 2350 0  STARTDES CAF     MAXTRIES         ALLOW 30 SECS.
 0346    REF   1                 10,2332  54 430 1            TS      DESCOUNT

 0347    REF  19 LAST 232        10,2333   3 7646 1            CAF     BIT10            SHOW DESIGNATE REQUIRED.
 0348    REF  41 LAST 236        10,2334  26 413 0            ADS     RADMODES
 0349    REF  15 LAST 236        10,2335   7 7645 0            MASK    BIT11            SEE IF REPOSITION IN PROGRESS.
 0350    REF 160 LAST 236        10,2336  10 000 0            CCS     A
 0351    REF   1                 10,2337   1 2345 0            TCF     DESRETRN         ECTR ALREADY SET UP.

 0352    REF   2 LAST 232        10,2340   0 2106 1            TC      SETRRECR         SET UP ERROR COUNTERS.

 0353    REF  23 LAST 218        10,2341   3 7656 0            CAF     TWO
 0354    REF  21 LAST 236        10,2342   0 4536 0            TC      WAITLIST
 0355                            10,2343    02422 1            2CADR   BEGDES
C0355    REF   2 LAST 232        10,2344    20003 0
 0356                            10,2345   0 0003 1  DESRETRN RELINT                   RETURN VIA DESRET
 0357    REF   4 LAST 237        10,2346   3 0427 0   +1      CA      DESRET
 0358    REF   2 LAST 118        10,2347   1 4105 0            TCF     BANKJUMP

 0359                            10,2350    00074 1  MAXTRIES DEC     60
```

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L0001   RADAR LEAD-IN ROUTINES                                                        USER'S OWN PAGE NO.  13

P0360             SEE IF RRDESSM CAN BE ACCOMPLISHED AFTER A REMODE.

 0361   REF    2 LAST 233      10,2351  0 2142 1  TRYSWS    TC      RMODINV         (NOTE RUPT INHIBIT)
 0362   REF    3 LAST 237      10,2352  0 4777 1            TC      RRLIMCHK        TRY DIFFERENT MODE.
 0363   REF    2 LAST  16      10,2353   00425 1            ADRES   MODEB
 0364   REF    1               10,2354  1 2361 0            TCF     NODESSM         VEHICLE MANEUVER REQUIRED.

 0365   REF    3 LAST 239      10,2355  0 2142 1            TC      RMODINV         RESET BIT12
 0366   REF   26 LAST 233      10,2356  3 7642 0            CAF     BIT14           SET FLAG FOR REMODE.
 0367   REF   42 LAST 238      10,2357  26 413 0            ADS     RADMODES

 0368   REF    1               10,2360  1 2330 1            TCF     OKDESSM

 0369   REF    4 LAST 239      10,2361  0 2142 1  NODESSM   TC      RMODINV         RE-INVERT MODE AND RETURN WITHOUT IN-
 0370   REF    2 LAST 238      10,2362  1 2345 0            TCF     DESRETRN        CREMENTING DESRET
```

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L0001   RADAR LEAD-IN ROUTINES                                                             USER'S OWN PAGE NO.  14

P0371             DESIGNATE TO SPECIFIC RR GIMBAL ANGLES (INDEPENDENT OF VEHICLE MOTION). ENTER WITH DESIRED ANGLES IN
R0373   TANG AND TANG +1.

 0374                            10,2363   77430 0  RRDESNB  STQ     EXIT                ENTER IN INTERP. - EXIT IN BASIC.
 0375   REF    5 LAST 238        10,2364   00427 0                   DESRET

 0376                            10,2365  0 0004 0           INHINT                      SEE IF CURRENT MODE OK.
 0377   REF    4 LAST 239        10,2366  0 4777 1           TC      RRLIMCHK
 0378   REF    4 LAST 235        10,2367   00423 1           ADRES   TANG
 0379   REF    1                 10,2370  1 2402 1           TCF     TRYSWN              SEE IF IN OTHER MODE.

 0380                            10,2371  0 0003 1  OKDESNB  RELINT
 0381   REF    4 LAST  54        10,2372  0 6000 1           TC      INTPRET

 0382                            10,2373   77634 0           CALL                        GET LOS IN NB COORDS.
 0383   REF    1                 10,2374   33243 1                   RRNB
 0384   REF    2 LAST 237        10,2375   00416 1           STORE   RRTARGET

 0385                            10,2376   77414 0           SET     EXIT
 0386   REF    2 LAST 237        10,2377   00071 1                   RRNBSW

 0387                            10,2400  0 0004 0           INHINT
 0388   REF    1                 10,2401  1 2331 0           TCF     STARTDES

 0389   REF    5 LAST 239        10,2402  0 2142 1  TRYSWN   TC      RMODINV             SEE IF OTHER MODE WILL DO.
 0390   REF    5 LAST 240        10,2403  0 4777 1           TC      RRLIMCHK
 0391   REF    5 LAST 240        10,2404   00423 1           ADRES   TANG
 0392   REF    1                 10,2405  1 2412 0           TCF     NODESNB             NOT POSSIBLE.

 0393   REF    6 LAST 240        10,2406  0 2142 1           TC      RMODINV
 0394   REF   27 LAST 239        10,2407  3 7642 0           CAF     BIT14               CALL FOR REMODE.
 0395   REF   43 LAST 239        10,2410  26 413 0           ADS     RADMODES
 0396   REF    1                 10,2411  1 2371 1           TCF     OKDESNB

 0397   REF   17 LAST 236        10,2412  3 7657 1  NODESNB  CAF     BIT1                CALL FOR ERROR RETURN.
 0398   REF   22 LAST 238        10,2413  0 4536 0           TC      WAITLIST
 0399                            10,2414   03251 1           2CADR   RDBADEND
C0399   REF    1                 10,2415   20003 0
 0400   REF    7 LAST 240        10,2416  0 2142 1           TC      RMODINV
 0401   REF   19 LAST 236        10,2417  0 5413 1           TC      ALARM               BAD GIMBAL ANGLE INPUTS.
 0402                            10,2420   00502 0           OCT     502
 0403   REF    3 LAST 239        10,2421  1 2346 0           TCF     DESRETRN +1         ALARM DID A RELINT.
```

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L0001   RADAR LEAD-IN ROUTINES                                                          USER'S OWN PAGE NO.  15

P0404              WAITLIST TASKS TO RUN RR DESIGNATION.

 0405   REF  28 LAST 240     10,2422  3 7642 0  BEGDES   CAF     BIT14              ENTER HERE FROM STARTDES OR REPOSRPT.
 0406   REF  44 LAST 240     10,2423  7 0413 0           MASK    RADMODES           SEE IF REMODE REQUIRED.
 0407   REF 161 LAST 238     10,2424  10 000 0           CCS     A
 0408   REF   1              10,2425  1 2115 1           TCF     REMODE
 0409   REF   2 LAST 233     10,2426  1 2431 1           TCF     STDESIG

 0410   REF   7 LAST 234     10,2427  0 4554 1  DESLOOP  TC      FIXDELAY           2 SAMPLES PER SECOND.
 0411                        10,2430   00062 0           DEC     50

 0412   REF  16 LAST 238     10,2431  3 7645 1  STDESIG  CAF     BIT11              ENTRY FROM BEGDES AND REMODE.
 0413   REF  45 LAST 241     10,2432  7 0413 0           MASK    RADMODES           SEE IF GIMBAL LIMIT MONITOR HAS FOUND US
 0414   REF 162 LAST 241     10,2433  10 000 0           CCS     A                  OUT OF BOUNDS. IF SO, THIS BIT SHOWS A
 0415   REF   1              10,2434  1 2454 1           TCF     BADDES             REPOSITION TO BE IN PROGRESS.

 0416   REF  46 LAST 241     10,2435  10 413 0           CCS     RADMODES           SEE IF CONTINUOUS DESIGNATE WANTED.
 0417                        10,2436  1 2441 0           TCF     +3                 IF SO, DONT CHECK BIT 10 TO SEE IF IN
 0418                        10,2437  1 2441 0           TCF     +2                 LIMITS BUT GO RIGHT TO FINDVAC ENTRY.
 0419   REF   1              10,2440  1 2461 1           TCF     MOREDES +1

 0420   REF  47 LAST 241     10,2441  4 0413 0           CS      RADMODES           IF NON-CONTINUOUS, SEE IF END OF
 0421   REF  20 LAST 238     10,2442  7 7646 0           MASK    BIT10              PROBLEM (DATA GOOD IF LOCK-ON WANTED OR
 0422   REF 163 LAST 241     10,2443  10 000 0           CCS     A                  WITHIN LIMITS IF NOT). IF SO, EXIT AFTER
 0423   REF   3 LAST 236     10,2444  1 3235 1           TCF     ENDRADAR           CHECKING RR CDU FAIL.

 0424   REF   2 LAST 238     10,2445  10 430 1           CCS     DESCOUNT           SEE IF TIME LIMIT HAS EXPIRED.
 0425   REF   2 LAST 241     10,2446  1 2460 0           TCF     MOREDES

 0426   REF  20 LAST 240     10,2447  0 5413 1           TC      ALARM              OUT OF TIME.
 0427                        10,2450   00503 1           OCT     503
 0428   REF   1              10,2451  4 2466 0           CS      B14+B2             IF OUT OF TIME, REMOVE ECR ENABLE + TRKR
 0429                        10,2452  0 0006 1           EXTEND
 0430                        10,2453  03 012 1           WAND    12
 0431   REF  21 LAST 241     10,2454  4 7646 0  BADDES   CS      BIT10              REMOVE DESIGNATE FLAG.
 0432   REF  48 LAST 241     10,2455  7 0413 0           MASK    RADMODES
 0433   REF  49 LAST 241     10,2456  54 413 0           TS      RADMODES
 0434   REF   2 LAST 240     10,2457  1 3251 0           TCF     RDBADEND

 0435   REF   3 LAST 241     10,2460  54 430 1  MOREDES  TS      DESCOUNT
 0436   REF   1              10,2461  3 4524 0           CAF     PRIO26             UPDATE GYRO TORQUE COMMANDS.
 0437   REF   2 LAST 152     10,2462  0 4374 0           TC      FINDVAC
 0438                        10,2463   02467 0           2CADR   DODES
C0438   REF   1              10,2464   20003 0
 0439   REF   1              10,2465  1 2427 0           TCF     DESLOOP

 0440                        10,2466   20002 1  B14+B2   OCT     20002
```

```
P0441             CALCULATE GYRO TORQUE COMMANDS.

 0442                             10,2467   0 0006 1  DODES     EXTEND
 0443   REF   5 LAST 234          10,2470   3 0036 1            DCA      OPTY
 0444   REF   6 LAST 240          10,2471   52 424 1            DXCH     TANG

 0445   REF   5 LAST 240          10,2472   0 6000 1            TC       INTPRET

 0446                             10,2473    77775 1            VLOAD                        MOVE TARGET VECTOR TO 32D.
 0447   REF   3 LAST 240          10,2474    00416 1                     RRTARGET
 0448                             10,2475    00041 1            STORE    32D

 0449                             10,2476    45014 0            BON      RTB                 DO STABLE-MEMBER TO NAVBASE TRANSFORMA-
 0450   REF   3 LAST 240          10,2477    00311 1                     RRNBSW              TION IF TARGET IN SM COORDS. OTHERWISE,
 0451   REF   1                   10,2500    20507 1                     DONBRD              IN NB COORDS ALREADY.
 0452   REF   2 LAST 237          10,2501    33361 0                     READCDUS

 0453                             10,2502    77731 1            SSP
 0454   REF   3 LAST 237          10,2503    00051 0                     S1
 0455                             10,2504    00024 1                     20D                 LOC OF ICDUS.
 0456                             10,2505    36025 0            STCALL   20D
 0457   REF   2 LAST 237          10,2506    32473 0                     SMNB
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L0001   RADAR LEAD-IN ROUTINES                                                              USER'S OWN PAGE NO.  17

 0458                          10,2507   67201 0  DONBRD    SETPD   SLOAD              DO NAVBASE TO RADAR DISH TRANSFORMATION.
 0459                          10,2510   00001 0                    0
 0460   REF    7 LAST 242      10,2511   00425 1                    TANG  +1
 0461                          10,2512   41424 0            RTB     PUSH               SHAFT COMMAND = V(32D).(COS(S), 0,
 0462   REF    1               10,2513   33345 0                    CDULOGIC                (-SIN(S)),
 0463                          10,2514   65356 1            SIN     PDDL               SIN(S) TO 0 AND COS(S) TO 2.
 0464                          10,2515   41546 0            COS     PUSH
 0465                          10,2516   65205 0            DMP     PDDL
 0466                          10,2517   00041 1                    32D
 0467                          10,2520   00045 0                    36D
 0468                          10,2521   44205 0            DMP     BDSU
 0469                          10,2522   00001 0                    0
 0470                          10,2523   77626 0            STADR
 0471   REF    8 LAST 243      10,2524   77352 0            STORE   TANG  +1           SHAFT COMMAND

 0472                          10,2525   45135 1            SLOAD   RTB
 0473   REF    9 LAST 243      10,2526   00424 0                    TANG
 0474   REF    2 LAST 243      10,2527   33345 0                    CDULOGIC
 0475                          10,2530   71406 0            PUSH    COS                COS(T) TO 4.
 0476                          10,2531   73525 1            PDDL    SIN
 0477                          10,2532   41206 0            PUSH    DMP                SIN(T) TO 6.
 0478                          10,2533   00003 1                    2
 0479                          10,2534   65352 0            SL1     PDDL               DEFINE VECTOR U = (SIN(T)SIN(S))
 0480                          10,2535   00005 1                    4                                    (COS(T)       )
 0481                          10,2536   41325 0            PDDL    DMP                                  (SIN(T)COS(S))
 0482                          10,2537   00007 0                    6
 0483                          10,2540   00001 0                    0
 0484                          10,2541   55552 0            SL1     VDEF
 0485                          10,2542   77441 0            DOT     EXIT               DOT U WITH LOS TO GET TRUNNION COMMAND.
 0486                          10,2543   00041 1                    32D
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L0001   RADAR LEAD-IN ROUTINES                                                      USER'S OWN PAGE NO.  18

P0487             AT THIS POINT WE HAVE A ROTATION VECTOR IN DISH AXES LYING IN THE TS PLANE. CONVERT THIS TO A
R0489   COMMANDED RATE AND ENABLE THE TRACKER IF WE ARE WITHIN 1 DEGREE OF THE TARGET.

 0491   REF 405 LAST 225      10,2544  4 0140 0            CS       MPAC            DOT WAS NEGATIVE OF DESIRED ANGLE.
 0492   REF  10 LAST 243      10,2545  54 423 0            TS       TANG

 0493   REF  50 LAST 241      10,2546  4 0413 0            CS       RADMODES        A RELAY IN THE RR REVERSES POLARITY OF
 0494   REF  14 LAST 233      10,2547  7 7644 1            MASK     BIT12           THE SHAFT COMMANDS IN MODE 2 SO THAT A
 0495   REF 164 LAST 241      10,2550  10 000 0            CCS      A               POSITIVE TORQUE APPLIED TO THE SHAFT
 0496                         10,2551  1 2554 0            TCF      +3              GYRO CAUSES A POSITIVE CHANGE IN THE

 0497   REF  11 LAST 244      10,2552  4 0424 1            CS       TANG +1         SHAFT ANGLE. COMPENSATE FOR THIS SWITCH
 0498   REF  12 LAST 244      10,2553  54 424 1            TS       TANG +1         BY CHANGING THE POLARITY OF OUR COMMAND.

 0499   REF  85 LAST 234      10,2554  3 7665 0            CAF      ZERO
 0500   REF 406 LAST 244      10,2555  54 141 1            TS       MPAC +1
 0501   REF  46 LAST 236      10,2556  3 7657 1            CAF      ONE

 0502   REF 407 LAST 244      10,2557  54 140 0  RRSCALUP  TS       MPAC
 0503   REF 165 LAST 244      10,2560  50 000 1            INDEX    A
 0504   REF  13 LAST 244      10,2561  3 0423 1            CA       TANG            TRUNNION COMPONENT OF ROTATION.
 0505                         10,2562  0 0006 1            EXTEND
 0506   REF   1               10,2563  7 2635 1            MP       RDESGAIN        SCALING ON INPUT ANGLE WAS 4 RADIANS.
 0507   REF 408 LAST 244      10,2564  50 140 1            INDEX    MPAC
 0508   REF  14 LAST 244      10,2565  56 423 1            XCH      TANG            MAKE EACH COMPONENT LESS THAN .7 DEGREES
 0509   REF   8 LAST 235      10,2566  0 4763 1            TC       MAGSUB          BEFORE SENDING TRACK ENABLE.
 0510                         10,2567   77715 1            DEC      -.00305
 0511   REF 409 LAST 244      10,2570  24 141 0            INCR     MPAC +1         IF OUT OF BOUNDS.

 0512   REF 410 LAST 244      10,2571  10 140 0            CCS      MPAC
 0513   REF   1               10,2572  1 2557 0            TCF      RRSCALUP
```

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P0514           SEE IF TRACKER SHOULD BE ENABLED OR DISABLED.

 0515                             10,2573  0 0004 0            INHINT

 0516   REF  51 LAST 244          10,2574  10 413 0            CCS      RADMODES        IF CONTINUOUS DESIGNATE WANTED, PUT OUT
 0517                             10,2575  1 2600 1            TCF      +3              COMMANDS WITHOUT CHECKING MAGNITUDE OF
 0518                             10,2576  1 2600 1            TCF      +2              ERROR SIGNALS.
 0519   REF   1                   10,2577  1 2625 0            TCF      TRKOFF

 0520   REF 411 LAST 244          10,2600  10 141 1            CCS      MPAC +1         SEE IF BOTH AXES WERE WITHIN .7 DEGS.
 0521   REF   2 LAST 245          10,2601  1 2625 0            TCF      TRKOFF

 0522   REF  17 LAST 236          10,2602  4 0061 1            CS       STATE           IF WITHIN LIMITS AND NO LOCK-ON WANTED,
 0523   REF   1                   10,2603  7 7653 1            MASK     LOKONFLG        PROBLEM IS FINISHED.
 0524   REF 166 LAST 244          10,2604  10 000 0            CCS      A
 0525   REF   1                   10,2605  1 2616 0            TCF      RRDESDUN

 0526   REF  29 LAST 241          10,2606  3 7642 0            CAF      BIT14           ENABLE THE TRACKER.
 0527                             10,2607  0 0006 1            EXTEND
 0528                             10,2610  05 012 1            WOR      12

 0529   REF  16 LAST 229          10,2611  3 7654 1            CAF      BIT4            SEE IF DATA GOOD RECEIVED YET.
 0530                             10,2612  0 0006 1            EXTEND
 0531                             10,2613  02 033 0            RAND     33
 0532   REF 167 LAST 245          10,2614  10 000 0            CCS      A
 0533   REF   1                   10,2615  1 2630 1            TCF      DORROUT

 0534   REF  22 LAST 241          10,2616  4 7646 0  RRDESDUN  CS       BIT10           WHEN PROBLEM DONE, REMOVE BIT 10 SO NEXT
 0535   REF  52 LAST 245          10,2617  7 0413 0            MASK     RADMODES        WAITLIST TASK WE WILL GO TO RGOODEND.
 0536   REF  53 LAST 245          10,2620  54 413 0            TS       RADMODES

 0537   REF  20 LAST 236          10,2621  4 7656 1            CS       BIT2
 0538                             10,2622  0 0006 1            EXTEND
 0539                             10,2623  03 012 1            WAND     12
 0540   REF   8 LAST 225          10,2624  1 4440 1            TCF      ENDOFJOB        WITH ECTR DISABLED.

 0541   REF  30 LAST 245          10,2625  4 7642 1  TRKOFF    CS       BIT14
 0542                             10,2626  0 0006 1            EXTEND
 0543                             10,2627  03 012 1            WAND     12

 0544   REF  54 LAST 245          10,2630  4 0413 0  DORROUT   CS       RADMODES        PUT OUT COMMAND UNLESS MONITOR
 0545   REF  17 LAST 241          10,2631  7 7645 0            MASK     BIT11           REPOSITION HAS TAKEN OVER.
 0546   REF 168 LAST 245          10,2632  10 000 0            CCS      A
 0547   REF   2 LAST 234          10,2633  0 2213 0            TC       RROUT

 0548   REF   9 LAST 245          10,2634  1 4440 1            TCF      ENDOFJOB

 0549                             10,2635    21122 0  RDESGAIN  DEC      .53624          TRIES TO NULL .5 ERROR IN .5 SEC.
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P0550   RADAR READ INITIALIZATION

R0551   RADAR DATA ARE READ BY A BANKCALL FOR THE APPROPRIATE LEAD-IN BELOW.


 0552   REF    1              10,2636  0 2652 1  LRALT    TC       INITREAD -1     ONE SAMPLE PER READING.
 0553                         10,2637   00017 1  ALLREAD  OCT      17

 0554   REF    2 LAST 246     10,2640  0 2653 0  LRVELZ   TC       INITREAD
 0555                         10,2641   00016 0           OCT      16

 0556   REF    3 LAST 246     10,2642  0 2653 0  LRVELY   TC       INITREAD
 0557                         10,2643   00015 0           OCT      15

 0558   REF    4 LAST 246     10,2644  0 2653 0  LRVELX   TC       INITREAD
 0559                         10,2645   00014 1           OCT      14

 0560   REF    5 LAST 246     10,2646  0 2652 1  RRRDOT   TC       INITREAD -1
 0561                         10,2647   00012 1           OCT      12

 0562   REF    6 LAST 246     10,2650  0 2652 1  RRRANGE  TC       INITREAD -1
 0563                         10,2651   00011 1           OCT      11
```

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L0001   RADAR LEAD-IN ROUTINES                                                               USER'S OWN PAGE NO.  21

 0564   REF  47 LAST 244      10,2652  3 7657 1   -1        CAF     ONE                    ENTRY TO TAKE ONLY 1 SAMPLE.
 0565                         10,2653  0 0004 0  INITREAD  INHINT

 0566   REF   1               10,2654  54 421 1             TS      TIMEHOLD               GET DT OF MIDPOINT OF NOMINAL SAMPLING
 0567                         10,2655  0 0006 1             EXTEND                         INTERVAL (ASSUMES NO BAD SAMPLES WILL BE
 0568   REF   3 LAST 222      10,2656  7 7655 1             MP      BIT3                   ENCOUNTERED).
 0569   REF   2 LAST 247      10,2657  52 422 1             DXCH    TIMEHOLD

 0570   REF 169 LAST 245      10,2660  10 000 0             CCS     A
 0571   REF   1               10,2661  54 425 0             TS      NSAMP
 0572   REF  48 LAST 247      10,2662  6 7657 1             AD      ONE
R0573           INSERT FOLLOWING INSTRUCTION TO GET 2N TRIES FOR N SAMPLES.
A0574                                                       DOUBLE
 0575   REF   2 LAST 158      10,2663  54 414 1             TS      SAMPLIM

 0576   REF   1               10,2664  3 2706 1             CAF     DGBITS                 READ CURRENT VALUE OF DATA GOOD BITS.
 0577                         10,2665  0 0006 1             EXTEND
 0578                         10,2666  02 033 0             RAND    33
 0579   REF   1               10,2667  54 427 1             TS      OLDATAGD

 0580   REF   1               10,2670  4 2637 0             CS      ALLREAD
 0581                         10,2671  0 0006 1             EXTEND
 0582                         10,2672  03 013 0             WAND    13                     REMOVE ALL RADAR BITS

 0583   REF 132 LAST 235      10,2673  50 002 0             INDEX   Q
 0584                         10,2674  3 0000 1             CAF     0
 0585                         10,2675  0 0006 1             EXTEND
 0586                         10,2676  05 013 0             WOR     13                     SET NEW RADAR BITS

 0587                         10,2677  0 0006 1             EXTEND
 0588   REF   2 LAST 222      10,2700  3 0025 0             DCA     TIME2
 0589   REF   3 LAST 247      10,2701  20 422 1             DAS     TIMEHOLD               TIME OF NOMINAL MIDPOINT.

 0590   REF  86 LAST 244      10,2702  3 7665 0             CAF     ZERO
 0591   REF  55 LAST 235      10,2703  54 001 1             TS      L
 0592   REF   3 LAST  16      10,2704  52 416 0             DXCH    SAMPLSUM
 0593   REF   3 LAST 236      10,2705  1 2302 0             TCF     ROADBACK

 0594                         10,2706   00230 0  DGBITS    OCT     230
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L0001   RADAR LEAD-IN ROUTINES                                                                    USER'S OWN PAGE NO.  22

P0595   RADAR RUPT READER

R0596   THIS ROUTINE STARTS FROM A RADARUPT. IT READS THE DATA $ LOTS MORE.

 0597   REF   5 LAST 222       10,2707  54 016 1  RADAREAD TS      BANKRUPT
 0598                          10,2710  0 0006 1           EXTEND
 0599   REF   6 LAST 222       10,2711  22 012 1           QXCH    QRUPT

 0600                          10,2712  0 0006 1  ANGLREAD EXTEND
 0601   REF   6 LAST 242       10,2713  3 0036 1           DCA     OPTY
 0602   REF   1                10,2714  52 420 0           DXCH    OPTYHOLD          SAVE RAW CDU ANGLES

 0603   REF   3 LAST 247       10,2715  10 414 1  TRYCOUNT CCS     SAMPLIM
 0604   REF   1                10,2716  1 2730 0           TCF     PLENTY
 0605   REF   1                10,2717  1 2723 1           TCF     NOMORE
 0606   REF  21 LAST 241       10,2720  0 5413 1           TC      ALARM
 0607                          10,2721   00520 0           OCT     520
 0608   REF   8 LAST 225       10,2722  0 4606 0           TC      RESUME

 0609   REF  22 LAST 248       10,2723  0 5413 1  NOMORE   TC      ALARM
 0610                          10,2724   00521 1           OCT     521
 0611   REF  49 LAST 247       10,2725  4 7657 0  BADRAD   CS      ONE
 0612   REF   4 LAST 248       10,2726  54 414 1           TS      SAMPLIM
 0613   REF   3 LAST 241       10,2727  0 3247 0           TC      RDBADEND -2

 0614   REF   5 LAST 248       10,2730  54 414 1  PLENTY   TS      SAMPLIM
 0615   REF   4 LAST 247       10,2731  3 7655 0           CAF     BIT3
 0616                          10,2732  0 0006 1           EXTEND
 0617                          10,2733  02 013 1           RAND    13                TO FIND OUT WHICH RADAR
 0618                          10,2734  0 0006 1           EXTEND
 0619   REF   1                10,2735  1 3014 0           BZF     RENDRAD

 0620   REF  55 LAST 245       10,2736  3 0413 1  LRPOSCHK CA      RADMODES          SEE IF LR IN DESIRED POSITION.
 0621                          10,2737  0 0006 1           EXTEND
 0622                          10,2740  06 033 1           RXOR    33
 0623   REF  21 LAST 211       10,2741  7 7652 0           MASK    BIT6
 0624                          10,2742  0 0006 1           EXTEND
 0625   REF   1                10,2743  1 2747 0           BZF     VELCHK

 0626   REF  23 LAST 248       10,2744  0 5413 1           TC      ALARM
 0627                          10,2745   00522 1           OCT     522
 0628   REF   1                10,2746  0 2725 0           TC      BADRAD

 0629   REF   1                10,2747  3 6165 0  VELCHK   CAF     BIN3              = 00003 OCT
 0630                          10,2750  0 0006 1           EXTEND
 0631                          10,2751  06 013 0           RXOR    13
 0632   REF   2 LAST 248       10,2752  7 6165 1           MASK    BIN3
 0633                          10,2753  0 0006 1           EXTEND
 0634   REF   1                10,2754  1 3010 1           BZF     LRHEIGHT          TAKE A LR RANGE READING
 0635   REF  20 LAST 229    10,2755  3 7637 1              CAF     POSMAX
 0636   REF   1             10,2756  7 0046 1              MASK    RNRAD
 0637   REF   1             10,2757  6 3167 1              AD      LVELBIAS
 0638   REF  56 LAST 247    10,2760  54 001 1              TS      L
 0639   REF   2 LAST 249    10,2761  30 046 0              CAE     RNRAD
 0640                       10,2762  6 0000 1              DOUBLE
 0641   REF  18 LAST 240    10,2763  7 7657 0              MASK    BIT1
 0642   REF   4 LAST   9    10,2764  52 071 0              DXCH    ITEMP3

 0643   REF  18 LAST 229    10,2765  3 7650 0              CAF     BIT8            DATA GOOD ISNT CHECKED UNTIL AFTER READ-
 0644   REF   1             10,2766  0 3137 1              TC      DGCHECK         ING DATA SO SOME RADAR TESTS WILL WORK
A0645                                                                              INDEPENDENT OF DATA GOOD.

 0646   REF   2 LAST 247    10,2767  10 425 0              CCS     NSAMP
 0647   REF   1             10,2770  0 3000 1              TC      NOEND
 0648   REF  50 LAST 248    10,2771  4 7657 0  GOODRAD     CS      ONE
 0649   REF   6 LAST 248    10,2772  54 414 1              TS      SAMPLIM
 0650   REF  33 LAST 235    10,2773  4 0065 0              CS      ITEMP1          WHEN ENOUGH GOOD DATA HAS BEEN GATHERED,
 0651   REF  56 LAST 248    10,2774  7 0413 0              MASK    RADMODES        RESET DATA FAIL FLAGS FOR SETTRKF.
 0652   REF  57 LAST 249    10,2775  54 413 0              TS      RADMODES
 0653   REF   3 LAST 231    10,2776  0 5042 1              TC      SETTRKF         LAMP MIGHT GO OFF IF DATA JUST GOOD.
 0654   REF   1             10,2777  0 3242 0              TC      RGOODEND -2

 0655   REF   3 LAST 249    10,3000  54 425 0  NOEND       TS      NSAMP
 0656   REF   7 LAST 249    10,3001  10 414 1  RESAMPLE    CCS     SAMPLIM         SEE IF ANY MORE TRIES SHOULD BE MADE.
 0657                       10,3002  1 3004 1              TCF     +2
 0658   REF   1             10,3003  1 3156 1              TCF     DATAFAIL        N SAMPLES NOT AVAILABLE.
 0659   REF  17 LAST 245    10,3004  3 7654 1              CAF     BIT4            RESET ACTIVITY BIT.
 0660                       10,3005  0 0006 1              EXTEND
 0661                       10,3006  05 013 0              WOR     13              RESET ACTIVITY BIT
 0662   REF   9 LAST 248    10,3007  0 4606 0              TC      RESUME


 0663   REF   8 LAST 236    10,3010  3 7653 0  LRHEIGHT    CAF     BIT5
 0664   REF  34 LAST 249    10,3011  54 065 0              TS      ITEMP1          (POSITION OF DATA GOOD BIT IN CHAN 33)

 0665   REF   9 LAST 213    10,3012  3 7647 0              CAF     BIT9
 0666   REF   1             10,3013  0 3047 1              TC      SCALECHK -1

 0667   REF  18 LAST 245    10,3014  3 7645 1  RENDRAD     CAF     BIT11           MAKE SURE ANTENNA HAS NOT GONE OUT OF
 0668   REF  58 LAST 249    10,3015  7 0413 0              MASK    RADMODES        LIMITS.
 0669   REF 170 LAST 247    10,3016  10 000 0              CCS     A
 0670   REF   2 LAST 248    10,3017  1 2725 1              TCF     BADRAD

 0671   REF  59 LAST 249    10,3020  4 0413 0              CS      RADMODES        BE SURE RR CDU HASNT FAILED.
 0672   REF  12 LAST 236    10,3021  7 7651 0              MASK    BIT7
 0673   REF 171 LAST 249    10,3022  10 000 0              CCS     A
 0674   REF   3 LAST 249    10,3023  1 2725 1              TCF     BADRAD
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L0001 RADAR LEAD-IN ROUTINES                                                    USER'S OWN PAGE NO.  24

0675  REF  15 LAST 244    10,3024  3 7644 0            CAF     BIT12          DONT ACCEPT RR DATA IF TRUNNION MORE
0676  REF  60 LAST 249    10,3025  7 0413 0            MASK    RADMODES       THAN 55 DEGREES FROM NOMINAL POSITION.
0677  REF 172 LAST 249    10,3026  10 000 0            CCS     A
0678  REF  17 LAST 233    10,3027  3 7641 0            CAF     BIT15          180 FOR MODE 2 - 0 FOR MODE 1.
0679                      10,3030  0 0006 1            EXTEND
0680  REF   7 LAST 248    10,3031  20 035 0            MSU     OPTY
0681  REF   9 LAST 244    10,3032  0 4763 1            TC      MAGSUB
0682                      10,3033   66161 1            DEC     -.30555        55 DEGS AT HALF-REVS.
0683  REF   4 LAST 249    10,3034  1 2725 1            TCF     BADRAD

0684  REF  18 LAST 249    10,3035  3 7654 1            CAF     BIT4           SEE IF DATA HAS BEEN GOOD.
0685  REF  35 LAST 249    10,3036  54 065 0            TS      ITEMP1         (POSITION OF DATA GOOD BIT IN CHAN 33)

0686  REF  19 LAST 249    10,3037  3 7657 1            CAF     BIT1           SEE IF RR RDOT.
0687                      10,3040  0 0006 1            EXTEND
0688                      10,3041  02 013 1            RAND    13
0689  REF 133 LAST 247    10,3042  54 002 1            TS      Q              FOR LATER TESTING.
0690  REF 173 LAST 250    10,3043  10 000 0            CCS     A
0691                      10,3044  1 3046 1            TCF     +2
0692  REF   1             10,3045  1 3060 0            TCF     RADIN          NO SCALE CHECK FOR RR RDOT.
0693  REF   5 LAST 248    10,3046  3 7655 0            CAF     BIT3
0694  REF  57 LAST 249    10,3047  54 001 1            TS      L

0695                      10,3050  0 0006 1  SCALECHK  EXTEND
0696                      10,3051  02 033 0            RAND    33             SCALE STATUS NOW
0697  REF  58 LAST 250    10,3052  56 001 0            XCH     L
0698  REF  61 LAST 250    10,3053  7 0413 0            MASK    RADMODES       SCALE STATUS BEFORE
0699                      10,3054  0 0006 1            EXTEND
0700                      10,3055  06 001 0            RXOR    01             SEE IF THEY DIFFER
0701  REF 174 LAST 250    10,3056  10 000 0            CCS     A
0702  REF   1             10,3057  0 3077 1            TC      SCALCHNG       THEY DIFFER

0703  REF  21 LAST 249    10,3060  3 7637 1  RADIN     CAF     POSMAX
0704  REF   3 LAST 249    10,3061  7 0046 1            MASK    RNRAD
0705  REF   8 LAST 204    10,3062  54 071 0            TS      ITEMP4

0706  REF   4 LAST 250    10,3063  30 046 0            CAE     RNRAD
0707                      10,3064  6 0000 1            DOUBLE
0708  REF  20 LAST 250    10,3065  7 7657 0            MASK    BIT1
0709  REF   5 LAST 249    10,3066  54 070 1            TS      ITEMP3

0710  REF 134 LAST 250    10,3067  10 002 1            CCS     Q              SEE IF RR RDOT.
0711  REF   1             10,3070  1 3111 1            TCF     SCALADJ        NO, BUT SCALE CHANGING MAY BE NEEDED.

0712                      10,3071  0 0006 1            EXTEND                 IF RR RANGE RATE, THROW OUT BIAS.
0713  REF   1             10,3072  4 3171 1            DCS     RDOTBIAS
0714  REF   6 LAST 250    10,3073  20 071 0  DASAMPL   DAS     ITEMP3
0715  REF  36 LAST 250    10,3074  3 0065 1  DGCHECK2  CA      ITEMP1         SEE THAT DATA HAS BEEN GOOD BEFORE AND
0716  REF   2 LAST 249    10,3075  0 3140 1            TC      DGCHECK +1     AFTER TAKING SAMPLE.
0717  REF   1             10,3076  0 2771 1            TC      GOODRAD
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 0718   REF  62 LAST 250     10,3077  22 413 1  SCALCHNG LXCH    RADMODES
 0719   REF  21 LAST 250     10,3100  6 7657 1           AD      BIT1
 0720                        10,3101  0 0006 1           EXTEND
 0721                        10,3102  06 001 0           RXOR    01
 0722   REF  63 LAST 251     10,3103  54 413 0           TS      RADMODES
 0723   REF   2 LAST 247     10,3104  3 2706 1           CAF     DGBITS          UPDATE LAST VALUE OF DATA GOOD BITS.
 0724                        10,3105  0 0006 1           EXTEND
 0725                        10,3106  02 033 0           RAND    33
 0726   REF   2 LAST 247     10,3107  54 427 1           TS      OLDATAGD
 0727   REF   5 LAST 250     10,3110  1 2725 1           TCF     BADRAD
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L0001   RADAR LEAD-IN ROUTINES                                                              USER'S OWN PAGE NO.  26

P0728          THE FOLLOWING ROUTINE INCORPORATES RR RANGE AND LR ALT SCALE INFORMATION AND LEAVES DATA AT LO SCALE.

 0730   REF  59 LAST 250      10,3111  10 001 1  SCALADJ  CCS     L                  L HAS SCALE INBIT FOR THIS RADAR.
 0731                         10,3112  1 3114 1           TCF     +2                 ON HIGH SCALE.
 0732   REF   1               10,3113  1 3074 0           TCF     DGCHECK2

 0733   REF   7 LAST 250      10,3114  52 071 0           DXCH    ITEMP3
 0734                         10,3115  20 001 1           DDOUBL
 0735                         10,3116  20 001 1           DDOUBL
 0736                         10,3117  20 001 1           DDOUBL
 0737   REF   8 LAST 252      10,3120  52 071 0           DXCH    ITEMP3

 0738   REF   6 LAST 250      10,3121  3 7655 0           CAF     BIT3               SEE IF LR OR RR.
 0739                         10,3122  0 0006 1           EXTEND
 0740                         10,3123  02 013 1           RAND    13
 0741                         10,3124  0 0006 1           EXTEND                     IF RR, NO MORE ACTION REQUIRED.
 0742   REF   2 LAST 252      10,3125  1 3074 0           BZF     DGCHECK2

 0743   REF   1               10,3126  3 3166 0           CAF     LRRATIO            IF LR, CONVERT TO LO SCALING.
 0744                         10,3127  0 0006 1           EXTEND
 0745   REF   9 LAST 250      10,3130  7 0071 0           MP      ITEMP4
 0746   REF  10 LAST 252      10,3131  54 071 0           TS      ITEMP4
 0747   REF  87 LAST 247      10,3132  3 7665 0           CAF     ZERO               (SO SUBSEQUENT DAS WILL BE OK)
 0748   REF   9 LAST 252      10,3133  56 070 0           XCH     ITEMP3
 0749                         10,3134  0 0006 1           EXTEND
 0750   REF   2 LAST 252      10,3135  7 3166 1           MP      LRRATIO
 0751   REF   1               10,3136  1 3073 1           TCF     DASAMPL
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L0001  RADAR LEAD-IN ROUTINES                                                         USER'S OWN PAGE NO.  27

 0752  REF  37 LAST 250    10,3137  54 065 0  DGCHECK   TS      ITEMP1         UPDATE DATA GOOD BIT IN OLDATAGD AND
 0753                      10,3140  0 0006 1            EXTEND                 MAKE SURE IT WAS ON BEFORE AND AFTER THE
 0754                      10,3141  02 033 0            RAND    33             SAMPLE WAS TAKEN BEFORE RETURNING. IF
 0755  REF  60 LAST 252    10,3142  54 001 1            TS      L              NOT, GOES TO RESAMPLE TO TRY AGAIN. IF
 0756  REF  38 LAST 253    10,3143  4 0065 0            CS      ITEMP1         MAX NUMBER OF TRIES HAS BEEN REACHED,
 0757  REF   3 LAST 251    10,3144  7 0427 1            MASK    OLDATAGD       THE BIT CORRESPONDING TO THE DATA GOOD
 0758  REF  61 LAST 253    10,3145  6 0001 0            AD      L              WHICH FAILED TO APPEAR IS IN ITEMP1 AND
 0759  REF   4 LAST 253    10,3146  56 427 0            XCH     OLDATAGD       CAN BE USED TO SET RADMODES WHICH VIA
 0760  REF  39 LAST 253    10,3147  7 0065 0            MASK    ITEMP1         SETTRKF SETS THE TRACKER FAIL LAMP.
 0761  REF  62 LAST 253    10,3150  6 0001 0            AD      L
 0762  REF 175 LAST 250    10,3151  10 000 0            CCS     A              SHOULD BOTH BE ZERO.
 0763  REF   1             10,3152  0 3001 0            TC      RESAMPLE
 0764  REF  10 LAST 252    10,3153  52 071 0            DXCH    ITEMP3         IF DATA GOOD BEFORE AND AFTER, ADD TO
 0765  REF   4 LAST 247    10,3154  20 416 0            DAS     SAMPLSUM       ACCUMULATION.
 0766  REF 135 LAST 250    10,3155  0 0002 0            TC      Q

 0767  REF  40 LAST 253    10,3156  4 0065 0  DATAFAIL  CS      ITEMP1         IN THE ABOVE CASE, SET RADMODES BIT
 0768  REF  64 LAST 251    10,3157  7 0413 0            MASK    RADMODES       SHOWING SOME RADAR DATA FAILED.
 0769  REF  41 LAST 253    10,3160  6 0065 1            AD      ITEMP1
 0770  REF  65 LAST 253    10,3161  54 413 0            TS      RADMODES

 0771  REF  11 LAST 253    10,3162  52 071 0            DXCH    ITEMP3         IF WE HAVE BEEN UNABLE TO GATHER N
 0772  REF   5 LAST 253    10,3163  52 416 0            DXCH    SAMPLSUM       SAMPLES, USE LAST ONE ONLY.

 0773  REF   4 LAST 249    10,3164  0 5042 1            TC      SETTRKF

 0774  REF   2 LAST 248    10,3165  1 2723 1            TCF     NOMORE

 0775                      10,3166   23773 0  LRRATIO   DEC     4.9977 B -3
 0776                      10,3167   50437 1  LVELBIAS  DEC     -12000         LANDING RADAR VELOCITY BIAS.
 0777                      10,3170   00001 0  RDOTBIAS  2DEC    17000          BIAS COUNT FOR RR RANGE RATE
C0777                      10,3171   01150 1
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L0001   RADAR LEAD-IN ROUTINES                                                                   USER'S OWN PAGE NO.  28

P0778   THIS ROUTINE CHANGES THE LR POSITION, AND CHECKS THAT IT GOT THERE.

 0779                            10,3172  0 0004 0  LRPOS2    INHINT

 0780   REF  22 LAST 248         10,3173  4 7652 0            CS       BIT6               DESIRED LR POSITION IS NOW 2.
 0781   REF  66 LAST 253         10,3174  7 0413 0            MASK     RADMODES
 0782   REF  23 LAST 254         10,3175  6 7652 1            AD       BIT6
 0783   REF  67 LAST 254         10,3176  54 413 0            TS       RADMODES

 0784   REF  13 LAST 249         10,3177  3 7651 1            CAF      BIT7
 0785                            10,3200  0 0006 1            EXTEND
 0786                            10,3201  02 033 0            RAND     33                 SEE IF ALREADY THERE.
 0787                            10,3202  0 0006 1            EXTEND
 0788   REF   2 LAST 236         10,3203  1 3227 1            BZF      RADNOOP

 0789   REF  18 LAST 236         10,3204  3 7643 1            CAF      BIT13
 0790                            10,3205  0 0006 1            EXTEND
 0791                            10,3206  05 012 1            WOR      12                 COMMAND TO POSITION 2

 0792   REF   1                  10,3207  3 3234 1            CAF      5SECS
 0793   REF  23 LAST 240         10,3210  0 4536 0            TC       WAITLIST
 0794                            10,3211   03214 0            2CADR    MAKESURE
C0794   REF   1                  10,3212   20003 0
 0795   REF   4 LAST 247         10,3213  0 2302 1            TC       ROADBACK

 0796   REF  19 LAST 254         10,3214  4 7643 0  MAKESURE  CS       BIT13              REMOVE LR POSITION COMMAND OUTBIT.
 0797                            10,3215  0 0006 1            EXTEND
 0798                            10,3216  03 012 1            WAND     12

 0799   REF  14 LAST 254         10,3217  3 7651 1            CAF      BIT7
 0800                            10,3220  0 0006 1            EXTEND
 0801                            10,3221  02 033 0            RAND     33
 0802                            10,3222  0 0006 1            EXTEND
 0803   REF   2 LAST 249         10,3223  1 3244 1            BZF      RGOODEND

 0804   REF  24 LAST 248         10,3224  0 5413 1            TC       ALARM              LR ANTENNA DIDNT MAKE IT.
 0805                            10,3225   00523 0            OCT      523
 0806   REF   4 LAST 248         10,3226  1 3251 0            TCF      RDBADEND

 0807   REF  51 LAST 249         10,3227  3 7657 1  RADNOOP   CAF      ONE                NO FURTHER ACTION REQUESTED.
 0808   REF  24 LAST 254         10,3230  0 4536 0            TC       WAITLIST
 0809                            10,3231   03244 0            2CADR    RGOODEND
C0809   REF   3 LAST 254         10,3232   20003 0
 0810   REF   5 LAST 254         10,3233  0 2302 1            TC       ROADBACK

 0811                            10,3234   00764 1  5SECS     DEC      5 E2
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L0001   RADAR LEAD-IN ROUTINES                                                           USER'S OWN PAGE NO.  29

P0812              SEQUENCES TO TERMINATE RR OPERATIONS.

 0813   REF  15 LAST 254     10,3235  3 7651 1  ENDRADAR CAF     BIT7              PROLOG TO CHECK RR CDU FAIL BEFORE END.
 0814   REF  68 LAST 254     10,3236  7 0413 0           MASK    RADMODES
 0815   REF 176 LAST 253     10,3237  10 000 0           CCS     A
 0816   REF   4 LAST 254     10,3240  1 3244 1           TCF     RGOODEND
 0817   REF   5 LAST 254     10,3241  1 3251 0           TCF     RDBADEND
 0818   REF  88 LAST 252     10,3242  4 7665 1   -2      CS      ZERO              RGOODEND WHEN NOT UNDER WAITLIST CONTROL
 0819   REF   5 LAST 147     10,3243  55'070 0           TS      RUPTAGN

 0820   REF  24 LAST 238     10,3244  3 7656 0  RGOODEND CAF     TWO
 0821   REF   4 LAST 223     10,3245  0 4102 0           TC      POSTJUMP
 0822   REF   4 LAST 221     10,3246   26667 1           CADR    GOODEND

 0823   REF  89 LAST 255     10,3247  4 7665 1   -2      CS      ZERO              RDBADEND WHEN NOT UNDER WAITLIST.
 0824   REF   6 LAST 255     10,3250  55'070 0           TS      RUPTAGN
 0825   REF  25 LAST 255     10,3251  3 7656 0  RDBADEND CAF     TWO
 0826   REF   5 LAST 255     10,3252  0 4102 0           TC      POSTJUMP
 0827   REF   2 LAST 205     10,3253   26664 1           CADR    BADEND

 0828   REF   4 LAST 226                 6165   BIN3     EQUALS  THREE
 0829                                 10,3254   ENDRMODS EQUALS
```

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L        RADAR TEST PROGRAMS                                                             USER'S OWN PAGE NO.   1

 0001    REF   1                          10,3254            SETLOC  ENDRMODS
 0002    REF   1                               E7            EBANK=  RSTKLOC

R0003              RADAR SAMPLING LOOP.

 0004    REF   1                10,3254  11'435 0  RADSAMP   CCS     RSAMPDT              TIMES NORMAL ONCE-PER-SECOND SAMPLING.
 0005                           10,3255  1 3257 0            TCF     +2

 0006    REF  19 LAST 232       10,3256  1 4602 0            TCF     TASKOVER             +0 INSERTED MANUALLY TERMINATES TEST.

 0007    REF  25 LAST 254       10,3257  0 4536 0            TC      WAITLIST
 0008                           10,3260   03254 1            2CADR   RADSAMP
C0008    REF   1                10,3261   20007 1
 0009    REF   1                10,3262  3 4523 1            CAF     PRIO25
 0010    REF   6 LAST 225       10,3263  0 4363 0            TC      NOVAC
 0011                           10,3264   03274 0            2CADR   DORSAMP
C0011    REF   1                10,3265   20007 1
 0012    REF   1                10,3266  3 3325 0            CAF     1/6                  FOR CYCLIC SAMPLING, RTSTDEX =
 0013                           10,3267  0 0006 1            EXTEND                       RTSTLOC/6 + RTSTBASE.
 0014    REF   2 LAST  25       10,3270  7 1434 1            MP      RTSTLOC
 0015    REF   1                10,3271  6 1433 1            AD      RTSTBASE             0 FOR RR, 2 FOR LR.
 0016    REF   1                10,3272  55'431 1            TS      RTSTDEX

 0017    REF  20 LAST 256       10,3273  1 4602 0            TCF     TASKOVER

R0018              DO THE ACTUAL RADAR SAMPLE.

 0019    REF   1                10,3274  0 3326 0  DORSAMP   TC      VARADAR              SELECTS VARIABLE RADAR CHANNEL.
 0020    REF   4 LAST 215       10,3275  0 4063 0            TC      BANKCALL
 0021    REF   2 LAST 207       10,3276   26712 1            CADR    RADSTALL
 0022    REF   1                10,3277  25'436 1            INCR    RFAILCNT             ADVANCE FAIL COUNTER BUT ACCEPT BAD DATA

 0023                           10,3300  0 0004 0  DORSAMP2  INHINT                       YES - UPDATE TM BUFFER.
 0024    REF   6 LAST 253       10,3301  52 416 0            DXCH    SAMPLSUM
 0025    REF   2 LAST 256       10,3302  51'434 0            INDEX   RSTKLOC
 0026    REF   1                10,3303  53'440 1            DXCH    RSTACK

 0027    REF   2 LAST 248       10,3304  52 420 0            DXCH    OPTYHOLD
 0028    REF   3 LAST 256       10,3305  51'434 0            INDEX   RSTKLOC
 0029    REF   2 LAST 256       10,3306  53'442 0            DXCH    RSTACK +2

 0030    REF   4 LAST 247       10,3307  52 422 1            DXCH    TIMEHOLD
 0031    REF   4 LAST 256       10,3310  51'434 0            INDEX   RSTKLOC
 0032    REF   3 LAST 256       10,3311  53'444 0            DXCH    RSTACK +4

 0033    REF   3 LAST 256       10,3312  4 1434 1            CS      RTSTLOC              CYCLE RTSTLOC.
 0034    REF   1                10,3313  6 1432 0            AD      RTSTMAX
 0035                           10,3314  0 0006 1            EXTEND
 0036                           10,3315  1 3320 1            BZF     +3
 0037    REF   5 LAST 256       10,3316  3 1434 0            CA      RSTKLOC
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L         RADAR TEST PROGRAMS                                                                   USER'S OWN PAGE NO.   2

 0038     REF    5 LAST 192      10,3317  6 6162 1            AD       SIX
 0039     REF    6 LAST 256      10,3320  55'434 1            TS       RSTKLOC

 0040     REF    2 LAST 256      10,3321  11'435 0            CCS      RSAMPDT                SEE IF TIME TO RE-SAMPLE.
 0041     REF   10 LAST 245      10,3322  1 4440 1            TCF      ENDOFJOB               NO - WAIT FOR T3 (REGULAR SAMPLING).

 0042     REF   11 LAST 257      10,3323  1 4440 1            TCF      ENDOFJOB               TEST TERMINATED.
 0043     REF    2 LAST 256      10,3324  1 3274 1            TCF      DORSAMP                JUMP RIGHT BACK AND GET ANOTHER SAMPLE.

 0044                            10,3325   05341 1  1/6       DEC      .17

R0045               VARIABLE RADAR DATA CALLER FOR ONE MEASUREMENT ONLY.

 0046     REF   52 LAST 254      10,3326  3 7657 1  VARADAR   CAF      ONE                    WILL BE SENT TO RADAR ROUTINE IN A BY
 0047     REF   22 LAST 207      10,3327  54 117 1            TS       BUF2                   SWCALL.
 0048     REF    2 LAST 256      10,3330  51'431 0            INDEX    RTSTDEX
 0049     REF    1               10,3331  3 3333 1            CAF      RDRLOCS
 0050     REF    3 LAST 154      10,3332  1 4067 0            TCF      SWCALL                 NOT TOUCHING Q.

 0051     REF    1               10,3333   20650 0  RDRLOCS   CADR     RRRANGE                =0
 0052     REF    1               10,3334   20646 1            CADR     RRRDOT                 =1
 0053     REF    1               10,3335   20644 0            CADR     LRVELX                 =2
 0054     REF    1               10,3336   20642 0            CADR     LRVELY                 =3
 0055     REF    1               10,3337   20640 1            CADR     LRVELZ                 =4
 0056     REF    1               10,3340   20636 0            CADR     LRALT                  =5

 0057                                     10'3341  ENDRTSTS EQUALS
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L       EXTENDED VERBS                                                                  USER'S OWN PAGE NO.  1

 0001                              11,2000              BANK     11
 0002   REF   1                         E5              EBANK=   OGC

R0003   FAN-OUT

 0004   REF   1             11,2000  0 2070 1  LST2FAN  TC       VBZERO         VB40 ZERO (USED WITH NOUN 20 OR 40 ONLY)
 0005   REF   1             11,2001  0 2073 1           TC       VBCOARK        VB41 COARSE ALIGN (USED WITH NOUN 20 OR
A0006                                                                                                             40 ONLY)
 0007   REF   1             11,2002  0 2204 0           TC       IMUFINEK       VB42 FINE ALIGN IMU
 0008   REF   1             11,2003  0 2566 0           TC       IMUATTCK       VB43  LOAD IMU ATTITUDE ERROR METERS.
 0009   REF   1             11,2004  0 2066 0           TC       ALM/END        ILLEGAL VERB.
 0010   REF   1             11,2005  1 2126 1           TCF      LRPOS2K        VB45 COMMAND LR TO POSITION 2.
 0011   REF   1             11,2006  0 2407 0           TC       REGRSAMP       VB46 SAMPLE RADAR ONCE PER SECOND
 0012   REF   1             11,2007  0 2401 0           TC       DOFCSTST       VB47 PERFORM LEM FCS TEST
 0013   REF   1             11,2010  0 2262 0           TC       GOLOADLV       VB50 PLEASE PERFORM
 0014   REF   2 LAST 258    11,2011  0 2262 0           TC       GOLOADLV       VB51 PLEASE MARK
 0015   REF   3 LAST 258    11,2012  0 2262 0           TC       GOLOADLV       VB52 PLEASE MARK Y
 0016   REF   4 LAST 258    11,2013  0 2262 0           TC       GOLOADLV       VB53 PLEASE MARK X OR Y.
 0017   REF   1             11,2014  0 2266 1           TC       TORQGYRS       VB54 PULSE TORQUE GYROS
 0018   REF   1             11,2015  0 2303 0           TC       ALINTIME       VB55 ALIGN TIME
 0019   REF   1             11,2016  0 2377 0           TC       GOSHOSUM       VB56 PERFORM BANKSUM
 0020   REF   1             11,2017  0 2327 0           TC       SYSTEST        VB57 PERFORM SYSTEM TEST
 0021   REF   1             11,2020  0 3142 0           TC       PRESTAND       VB60 PREPARE FOR STANDBY
 0022   REF   1             11,2021  0 3210 1           TC       POSTAND        VB61 RECOVER FROM STANDBY
 0023   REF   1             11,2022  0 2634 1           TC       SETUPMSG       VB62 SCAN LEM INBITS
 0024   REF   1             11,2023  1 2524 1           TCF      AGSINIT        VB63 INITIALIZE AGS
 0025   REF   2 LAST 258    11,2024  1 2066 1           TCF      ALM/END
 0026   REF   3 LAST 258    11,2025  1 2066 1           TCF      ALM/END
 0027   REF   4 LAST 258    11,2026  1 2066 1           TCF      ALM/END
 0028   REF   5 LAST 258    11,2027  1 2066 1           TCF      ALM/END
 0029   REF   6 LAST 258    11,2030  1 2066 1           TCF      ALM/END
 0030   REF   7 LAST 258    11,2031  1 2066 1           TCF      ALM/END
 0031   REF   8 LAST 258    11,2032  1 2066 1           TCF      ALM/END
 0032   REF   1             11,2033  1 3122 1           TCF      MINIMP         VERB 73 - RHC USED FOR MINIMUM IMPULSE.
 0033   REF   1             11,2034  1 3130 1           TCF      NOMINIMP       VERB 74 - RHC NOT USED FOR MIN IMPULSE.

 0034   REF   9 LAST 258    11,2035  1 2066 1           TCF      ALM/END
 0035   REF  10 LAST 258    11,2036  1 2066 1           TCF      ALM/END
 0036   REF  11 LAST 258    11,2037  0 2066 0           TC       ALM/END

 0037   REF   7 LAST 252    11,2040  3 7655 0  TESTXACT CAF      BIT3
 0038   REF   2 LAST 158    11,2041  7 0332 1           MASK     EXTVBACT
 0039   REF 177 LAST 255    11,2042 10 000 0            CCS      A
 0040   REF   1             11,2043  0 2053 0           TC       XACTALM

 0041   REF   8 LAST 258    11,2044  4 7655 1  XACT1    CS       BIT3
 0042                       11,2045  0 0004 0           INHINT
 0043   REF   3 LAST 258    11,2046  7 0332 1           MASK     EXTVBACT
 0044   REF   9 LAST 258    11,2047  6 7655 0           AD       BIT3
 0045   REF   4 LAST 258    11,2050 54 332 1            TS       EXTVBACT
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L       EXTENDED VERBS                                                                          USER'S OWN PAGE NO.   2

 0046                          11,2051   0 0003 1             RELINT
 0047   REF 136 LAST 253       11,2052   0 0002 0             TC       Q

 0048   REF   1                11,2053   0 5243 1  XACTALM    TC       FALTON
 0049   REF  12 LAST 257       11,2054   0 4440 0             TC       ENDOFJOB

 0050   REF   2 LAST 127       11,2055   0 5401 1  TERMEXTV   TC       FREEDSP          IF WE GET A TERMINATE INSTEAD OF A LOAD,

 0051   REF   1                11,2056   0 2060 0  ENDEXTVB   TC       XACTO
 0052   REF  13 LAST 259       11,2057   0 4440 0             TC       ENDOFJOB

 0053   REF  10 LAST 258       11,2060   4 7655 1  XACTO      CS       BIT3
 0054                          11,2061   0 0004 0             INHINT
 0055   REF   5 LAST 258       11,2062   7 0332 1             MASK     EXTVBACT
 0056   REF   6 LAST 259       11,2063   54 332 1             TS       EXTVBACT
 0057                          11,2064   0 0003 1             RELINT
 0058   REF 137 LAST 259       11,2065   0 0002 0  XACTOQ     TC       Q


 0059   REF   2 LAST 259       11,2066   0 5243 1  ALM/END    TC       FALTON
 0060   REF   1                11,2067   0 2056 0             TC       ENDEXTVB


 0061   REF   1                11,2070   0 2076 1  VBZERO     TC       OP/INERT
 0062   REF   1                11,2071   0 2110 0             TC       IMUZEROK         RETURN HERE IF NOUN = ICDU(20)
 0063   REF   1                11,2072   0 2117 1             TC       RRZEROK          RETURN HERE IF NOUN = RCDU(40)

 0065   REF   2 LAST 259       11,2073   0 2076 1  VBCOARK    TC       OP/INERT
 0066   REF   1                11,2074   0 2132 0             TC       IMUCOARK         RETURN HERE IF NOUN = ICDU(20)
 0067   REF   1                11,2075   0 2234 0             TC       RRDESNBK         RETURN HERE IF NOUN = RCDU(40)

R0069                 RETURNS TO L+1 IF IMU, L+2 IF RR, AND L+3 IF OT.

 0070   REF   9 LAST 249       11,2076   4 7653 1  OP/INERT   CS       BIT5             OCT20
 0071   REF   2 LAST 157       11,2077   6 0267 1             AD       NOUNREG
 0072                          11,2100   0 0006 1             EXTEND
 0073   REF   1                11,2101   1 2065 1             BZF      XACTOQ           IF = 20.

 0074   REF 138 LAST 259       11,2102   24 002 0             INCR     Q
 0075   REF   1                11,2103   6 2107 0             AD       RRIMUDIF         = -20 OCT.
 0076                          11,2104   0 0006 1             EXTEND
 0077   REF   2 LAST 259       11,2105   1 2065 1             BZF      XACTOQ

 0082   REF  12 LAST 258       11,2106   0 2066 0             TC       ALM/END          ILLEGAL.

 0083                          11,2107    77757 1  RRIMUDIF   OCT      -20
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L       EXTENDED VERBS                                                                        USER'S OWN PAGE NO.   3

P0085   KEYBOARD REQUEST TO ZERO IMU ENCODERS

 0086   REF   1                  11,2110  0 2040 1  IMUZEROK TC       TESTXACT          ZERO ENCODERS.
 0087   REF   5 LAST 256         11,2111  0 4063 0           TC       BANKCALL
 0088   REF   1                  11,2112   26000 0           CADR     IMUZERO

 0089   REF   6 LAST 260         11,2113  0 4063 0           TC       BANKCALL          STALL
 0090   REF   2 LAST 215         11,2114   26716 0           CADR     IMUSTALL
 0091                            11,2115  0 2116 0           TC       +1

 0092   REF   2 LAST 259         11,2116  0 2056 0           TC       ENDEXTVB
 0093   REF   2 LAST 260         11,2117  0 2040 1  RRZEROK  TC       TESTXACT
 0094   REF   7 LAST 260         11,2120  0 4063 0           TC       BANKCALL          ZERO RR CDUS.
 0095   REF   1                  11,2121   20247 1           CADR     RRZERO

 0096   REF   8 LAST 260         11,2122  0 4063 0  RWAITK   TC       BANKCALL
 0097   REF   3 LAST 256         11,2123   26712 1           CADR     RADSTALL
 0098                            11,2124  1 2125 1           TCF      +1
 0099   REF   3 LAST 260         11,2125  1 2056 1           TCF      ENDEXTVB

 0100   REF   3 LAST 260         11,2126  0 2040 1  LRPOS2K  TC       TESTXACT          COMMAND LR TO POSITION 2.
 0101   REF   9 LAST 260         11,2127  0 4063 0           TC       BANKCALL
 0102   REF   1                  11,2130   21172 0           CADR     LRPOS2
 0103   REF   1                  11,2131  1 2122 0           TCF      RWAITK
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L       EXTENDED VERBS                                                                      USER'S OWN PAGE NO.   4

P0104   KEYBOARD REQUEST TO COARSE ALIGN THE IMU

 0105   REF    4 LAST 260     11,2132  0 2040 1  IMUCOARK TC       TESTXACT          COARSE ALIGN FROM KEYBOARD.
 0106   REF    1              11,2133  0 5317 1           TC       GRABWAIT
 0107   REF    1              11,2134  3 2152 0           CAF      VNLODCDU          CALL FOR THETAD LOAD
 0108   REF    4 LAST 220     11,2135  0 5332 0           TC       NVSBWAIT
 0109   REF    4 LAST 220     11,2136  0 5140 1           TC       ENDIDLE           STALL WAITING FOR THE LOAD
 0110   REF    1              11,2137  0 2055 0           TC       TERMEXTV
 0111   REF    1              11,2140  0 2154 0           TC       ICSDEL            PROCEED - ASK FOR INCREMENTAL LOAD.

 0112   REF    1              11,2141  3 2153 1  ICORK2   CAF      IMUCOARV          RE-DISPLAY COARSE ALIGN VERB.
 0113   REF    5 LAST 261     11,2142  0 5332 0           TC       NVSBWAIT
 0114   REF    3 LAST 259     11,2143  0 5401 1           TC       FREEDSP           RELEASE THE DISPLAYS

 0115   REF   10 LAST 260     11,2144  0 4063 0           TC       BANKCALL          CALL MODE SWITCHING PROG
 0116   REF    1              11,2145    26055 0           CADR     IMUCOARS

 0117   REF   11 LAST 261     11,2146  0 4063 0           TC       BANKCALL          STALL
 0118   REF    3 LAST 260     11,2147    26716 0           CADR     IMUSTALL
 0119   REF    4 LAST 260     11,2150  0 2056 0           TC       ENDEXTVB
 0120   REF    5 LAST 261     11,2151  0 2056 0           TC       ENDEXTVB

 0121                         11,2152    02522 0  VNLODCDU OCT      02522
 0122                         11,2153    04100 1  IMUCOARV OCT      04100
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P0123            PROVISION FOR COARSE ALIGN TO INCREMENTAL ANGLES.

 0124    REF   1               11,2154  3 2202 0  ICSDEL    CAF     DELLOAD
 0125    REF   6 LAST 261      11,2155  0 5332 0            TC      NVSBWAIT         REQUEST LOAD OF DELTA ICDU ANGLES.
 0126    REF   5 LAST 261      11,2156  0 5140 1            TC      ENDIDLE
 0127    REF   2 LAST 261      11,2157  0 2055 0            TC      TERMEXTV
 0128    REF   1               11,2160  0 2141 1            TC      ICORK2           PROCEED WITHOUT DATA HERE TOO.
 0129    REF   1               11,2161  0 2163 1            TC      INCLOOP          LOOP TO INCREMENT THETAD FROM DSPTEM2.
 0130    REF   2 LAST 262      11,2162  0 2141 1            TC      ICORK2           RE-DISPLAY COARSE ALIGN VERB.

 0131    REF 139 LAST 259      11,2163  56 002 0  INCLOOP   XCH     Q                INCREMENTS THETADS IN 2S COMPLEMENT FROM
 0132    REF 412 LAST 245      11,2164  54 140 0            TS      MPAC              THREE ANGLE INCREMENTS IN DSPTEM2S.
 0133    REF   1               11,2165  3 2203 1            CAF     LTHD+2
 0134    REF 112 LAST 217      11,2166  54 114 1            TS      BUF              SET UP FOR CDUINC.
 0135    REF  26 LAST 255      11,2167  3 7656 0            CAF     TWO              THREE TIMES THROUGH.

 0136    REF 413 LAST 262      11,2170  54 141 1  INCLOOP2  TS      MPAC +1
 0137    REF 178 LAST 258      11,2171  50 000 1            INDEX   A
 0138    REF   3 LAST 220      11,2172  56 336 1            XCH     DSPTEM2          INCREMENT TO TEM2 FOR CDUINC.
 0139    REF  12 LAST 261      11,2173  0 4063 0            TC      BANKCALL
 0140    REF   1               11,2174   33470 1            CADR    CDUINC
 0141    REF 113 LAST 262      11,2175  10 114 1            CCS     BUF
 0142    REF 114 LAST 262      11,2176  54 114 1            TS      BUF
 0143    REF 414 LAST 262      11,2177  10 141 1            CCS     MPAC +1
 0144    REF   1               11,2200  0 2170 0            TC      INCLOOP2

 0145    REF 415 LAST 262      11,2201  0 0140 1            TC      MPAC             RETURN WHEN FINISHED.

 0146                          11,2202   02523 1  DELLOAD   OCT     02523
 0147    REF   3 LAST 194      11,2203   00402 1  LTHD+2    ADRES   THETAD +2
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L        EXTENDED VERBS                                                          USER'S OWN PAGE NO.   6

P0148    KEYBOARD REQUEST TO FINE ALIGN AND GYRO TORQUE IMU

 0149    REF    5 LAST 261      11,2204   0 2040 1  IMUFINEK TC       TESTXACT        FINE ALIGN WITH GYRO TORQUING.
 0150    REF    2 LAST 261      11,2205   0 5317 1           TC       GRABWAIT
 0151    REF    1               11,2206   3 2232 0           CAF      VNLODGYR        CALL FOR LOAD OF GYRO COMMANDS
 0152    REF    7 LAST 262      11,2207   0 5332 0           TC       NVSBWAIT
 0153    REF    6 LAST 262      11,2210   0 5140 1           TC       ENDIDLE         HOLD UP FOR THE DATA LOAD
 0154    REF    3 LAST 262      11,2211   0 2055 0           TC       TERMEXTV
 0155                           11,2212   0 2213 0           TC       +1              PROCEED WITHOUT A LOAD

 0156    REF    1               11,2213   3 2233 1           CAF      IMUFINEV        RE-DISPLAY OUR OWN VERB
 0157    REF    8 LAST 263      11,2214   0 5332 0           TC       NVSBWAIT
 0158    REF    4 LAST 261      11,2215   0 5401 1           TC       FREEDSP         RELEASE DISPLAYS

 0159    REF   13 LAST 262      11,2216   0 4063 0           TC       BANKCALL        CALL MODE SWITCH PROG
 0160    REF    1               11,2217    26227 1           CADR     IMUFINE

 0161    REF   14 LAST 263      11,2220   0 4063 0           TC       BANKCALL        HIBERNATION
 0162    REF    4 LAST 261      11,2221    26716 0           CADR     IMUSTALL
 0163    REF    6 LAST 261      11,2222   0 2056 0           TC       ENDEXTVB

 0164    REF    1               11,2223   3 2301 1  FINEK2   CAF      LGYROBIN        PINBALL LEFT COMMANDS IN OGC REGIST5RS
 0165    REF   15 LAST 263      11,2224   0 4063 0           TC       BANKCALL
 0166    REF    2 LAST 215      11,2225    26317 0           CADR     IMUPULSE

 0167    REF   16 LAST 263      11,2226   0 4063 0           TC       BANKCALL        WAIT FOR PULSES TO GET OUT.
 0168    REF    5 LAST 263      11,2227    26716 0           CADR     IMUSTALL
 0169    REF    7 LAST 263      11,2230   0 2056 0           TC       ENDEXTVB
 0170    REF    8 LAST 263      11,2231   0 2056 0           TC       ENDEXTVB

 0171                           11,2232    02567 1  VNLODGYR OCT      02567
 0172                           11,2233    04200 1  IMUFINEV OCT      04200           FINE ALIGN VERB
```

```
P0173              DESIGNATE TO DESIRED GIMBAL ANGLES.

 0174    REF   6 LAST 263      11,2234  0 2040 1  RRDESNBK TC      TESTXACT
 0175    REF   3 LAST 263      11,2235  0 5317 1           TC      GRABWAIT
 0176    REF   1               11,2236  3 2255 1           CAF     VNLDRCDU          ASK FOR GIMBAL ANGLES.
 0177    REF   9 LAST 263      11,2237  0 5332 0           TC      NVSBWAIT
 0178    REF   7 LAST 263      11,2240  0 5140 1           TC      ENDIDLE           WAIT FOR THE LOAD
 0179    REF   4 LAST 263      11,2241  0 2055 0           TC      TERMEXTV
 0180                          11,2242  0 2243 0           TC      +1                PROCEED

 0181    REF  17 LAST 263      11,2243  0 4063 0           TC      BANKCALL          ASK OP FOR LOCK ON REQUIREMENTS.
 0182    REF   1               11,2244    23001 1          CADR    AURLOKON

 0183    REF   1               11,2245  3 2153 1           CAF     OPTCOARV          RE-DISPLAY OUR OWN VERB
 0184    REF  10 LAST 264      11,2246  0 5332 0           TC      NVSBWAIT
 0185                          11,2247  0 0004 0           INHINT                    FIRE UP JOB TO DO DESIGNATE.
 0186    REF   1               11,2250  3 7642 0           CAF     PRIO20
 0187    REF   3 LAST 241      11,2251  0 4374 0           TC      FINDVAC
 0188                          11,2252    02256 1          2CADR   RRDESK2
C0188    REF   1               11,2253    22005 1
 0189    REF   5 LAST 264      11,2254  1 2055 1           TCF     TERMEXTV          FREES DISPLAY.

 0190                          11,2255    02441 1 VNLDRCDU OCT     2441
 0191    REF   2 LAST 261               11,2153   OPTCOARV EQUALS  IMUCOARV          DIFFERENT NOUNS.

 0192    REF   6 LAST 242      11,2256  0 6000 1  RRDESK2  TC      INTPRET

 0193                          11,2257    77634 0          CALL
 0194    REF   1               11,2260    20363 0                  RRDESNB           RETURNS IN BASIC.

 0195    REF   2 LAST 260      11,2261  0 2122 1           TC      RWAITK

R0196    PLEASE PERFORM VERB AND PLEASE MARK VERB ----- PRESSING ENTER INDICATES
R0197    ACTION REQUESTED HAS BEEN PERFORMED, AND DOES SAME RECALL AS A COMPLETED
R0198    LOAD.  OPERATOR SHOULD DO VB PROCEED WITHOUT DATA IF HE WISHES NOT TO
R0199    PERFORM THE REQUESTED ACTION.

 0200    REF   1               11,2262  0 5300 1  GOLOADLV TC      FLASHOFF
 0201    REF   2 LAST 259      11,2263  0 2060 0           TC      XACT0
 0202    REF   6 LAST 255      11,2264  0 4102 0           TC      POSTJUMP
 0203    REF   1               11,2265    12002 0          CADR    LOADLV1
```

```
P0204    KEYBOARD REQUEST TO PULSE TORQUE IRIGA


 0205    REF   7 LAST 264    11,2266  0 2040 1  TORQGYRS TC       TESTXACT        GYRO TORQUING WITH NO MODE-SWITCH.
 0206    REF   4 LAST 264    11,2267  0 5317 1           TC       GRABWAIT
 0207    REF   2 LAST 263    11,2270  3 2232 0           CAF      VNLODGYR
 0208    REF  11 LAST 264    11,2271  0 5332 0           TC       NVSBWAIT
 0209    REF   8 LAST 264    11,2272  0 5140 1           TC       ENDIDLE
 0210    REF   6 LAST 264    11,2273  0 2055 0           TC       TERMEXTV
 0211                        11,2274  0 2275 0           TC       +1
 0212    REF   1             11,2275  3 2302 1           CAF      TORQGYRV        RE-DISPLAY OUR OWN VERB
 0213    REF  12 LAST 265    11,2276  0 5332 0           TC       NVSBWAIT
 0214    REF   5 LAST 263    11,2277  0 5401 1           TC       FREEDSP
 0215    REF   1             11,2300  1 2223 1           TCF      FINEK2

 0216    REF   6 LAST 212    11,2301    00403 0  LGYROBIN ECADR    DELVX
 0217                        11,2302    05400 0  TORQGYRV OCT      05400
```

```
P0218   ALIGN TIME
 0219   REF    1                11,2303  3 2326 1  ALINTIME CAF     VNLODDT              USES NVSUBMON. DOES NOT TEST DSPLOCK.
 0220   REF    2 LAST 225       11,2304  54 107 0           TS      NVTEMP               DOES NOT KILL MONITOR.
 0221   REF    1                11,2305  0 5123 1           TC      NVSUBMON
 0222   REF   14 LAST 259       11,2306  0 4440 0           TC      ENDOFJOB             IN CASE OF ALARM IN LOAD REQUEST SET UP.
 0223   REF    9 LAST 265       11,2307  0 5140 1           TC      ENDIDLE
 0224   REF   15 LAST 266       11,2310  0 4440 0           TC      ENDOFJOB             TERMINATE
 0225   REF   16 LAST 266       11,2311  0 4440 0           TC      ENDOFJOB             PROCEED WITHOUT DATA
 0226                           11,2312  0 0004 0  UPDATIME INHINT                       DELTA TIME IS IN DSPTEM1, +1.
 0227   REF   90 LAST 255       11,2313  3 7665 0           CAF     ZERO
 0228   REF  416 LAST 262       11,2314  54 142 1           TS      MPAC      +2         NEEDED FOR TP AGREE
 0229   REF   63 LAST 253       11,2315  54 001 1           TS      L                    ZERO T1 & 2 WHILE ALIGNING.
 0230   REF    3 LAST 247       11,2316  52 025 1           DXCH    TIME2
 0231   REF  417 LAST 266       11,2317  52 141 1           DXCH    MPAC
 0232   REF    1                11,2320  52 334 1           DXCH    DSPTEM1              INCREMENT.
 0233   REF  418 LAST 266       11,2321  20 141 1           DAS     MPAC

 0234   REF    2 LAST 198       11,2322  0 7235 1           TC      TPAGREE              FORCE SIGN AGREEMENT.
 0235   REF  419 LAST 266       11,2323  52 141 1           DXCH    MPAC                 NEW CLOCK.
 0236   REF    4 LAST 266       11,2324  20 025 1           DAS     TIME2
 0237   REF   17 LAST 266       11,2325  0 4440 0           TC      ENDOFJOB

 0238                           11,2326   02124 1  VNLODDT  OCT     02124                V/N FOR LOAD DELTA TIME
```

```
P0243              SELECT AND INITIATE DESIRED SYSTEM TEST PROGRAM.

 0244    REF   1                            E5          EBANK= QPLACE

 0245    REF    5 LAST 151     11,2327  10 276 0  SYSTEST  CCS     MODREG          DEMAND MODE 00.
 0246    REF    2 LAST 258     11,2330   1 2053 1           TCF     XACTALM

 0247    REF    5 LAST 265     11,2331   0 5317 1           TC      GRABWAIT
 0248    REF    1              11,2332   3 2376 1  REDO     CAF     LQPL            ASK FOR TEST OPTION (1 - 7).
 0249    REF  420 LAST 266     11,2333  54 142 1            TS      MPAC +2
 0250    REF    1              11,2334   3 2375 1           CAF     TESTNV
 0251    REF   13 LAST 265     11,2335   0 5332 0           TC      NVSBWAIT
 0252    REF   10 LAST 266     11,2336   0 5140 1           TC      ENDIDLE
 0253    REF    1              11,2337   0 4437 0           TC      EJFREE
 0254    REF    1              11,2340   0 2332 1           TC      REDO

 0255    REF    1              11,2341   0 4667 1           TC      NEWMODEX
 0256                          11,2342    00007 0           OCT     07

 0257                          11,2343   0 0004 0           INHINT
 0258    REF    2 LAST 264     11,2344   3 7642 0           CAF     PRIO20
 0259    REF    4 LAST 264     11,2345   0 4374 0           TC      FINDVAC
 0260                          11,2346    02351 1           2CADR   TSELECT
C0260    REF    1              11,2347    22005 1
 0261    REF   18 LAST 266     11,2350   0 4440 0           TC      ENDOFJOB        LEAVING DISPLAY GRABBED FOR SYSTEM TEST.

 0262    REF    2 LAST 148     11,2351   3 5224 0  TSELECT  CAF     LOW5
 0263    REF    2 LAST 267     11,2352   7 1546 0           MASK    QPLACE          SAFETY PLAY.
 0264    REF  179 LAST 262     11,2353  50 000 1            INDEX   A
 0265    REF    1              11,2354   3 2356 0           CAF     TESTCADR
 0266    REF    3 LAST 238     11,2355   0 4105 1           TC      BANKJUMP

 0267    REF   13 LAST 259     11,2356    22066 1  TESTCADR CADR    ALM/END         0  ILLEGAL
 0268    REF    1              11,2357    36000 1           CADR    IMUTEST         1  GYRO DRIFT TEST
 0269    REF    1              11,2360    36024 1           CADR    IMUBACK         2 REPEAT OF IMUTEST
 0270    REF    1              11,2361    30000 1           CADR    AOTNBIMU        3  IMU ALIGNMENT TEST
 0271    REF    1              11,2362    36245 1           CADR    OPCHK           4  IMU CHECK
 0272    REF    1              11,2363    36445 1           CADR    GYRSFTST        5  GYRO TORQUING TEST
 0273                          11,2364    22364 0           CADR                     AVAILABLE
 0274    REF    1              11,2365    43413 0           CADR    GTSCPSS         7. OPTIMUM COMPASS
 0275    REF    1              11,2366    34556 0           CADR    SAMODCHK        10 SEMI-AUTOMATIC MODING CHECK
 0276    REF    1              11,2367    31324 0           CADR    SAUTOIFS        11 SEMI-AUTOMATIC INTERFACE TEST
 0277    REF    1              11,2370    31562 1           CADR    AOTANGCK        12 AOT ANGLE CHECK
 0278    REF    1              11,2371    31120 0           CADR    RDRINIT         13 RENDEZVOUS RADAR / ANTENNAE TRACKING
 0279    REF    1              11,2372    22403 0           CADR    FSTRSAMP        14 HIGH SPEED RADAR SAMPLING.

 0280    REF    1              11,2373    31613 1           CADR    ZEROERAS
 0281    REF    1              11,2374    23030 0           CADR    DISINDT         DISPLAY INERTIAL DATA TEST.
 0282                          11,2375    02101 0  TESTNV   OCT     2101
 0283    REF    3 LAST 267     11,2376    02546 1  LQPL     ECADR   QPLACE
```

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L         EXTENDED VERBS                                                                            USER'S OWN PAGE NO.  11

0284    REF   7 LAST 264        11,2377  0 4102 0  GOSHOSUM TC       POSTJUMP          START ROUTINE TO DISPLAY SUM OF EACH
0285    REF   1                 11,2400   41454 1           CADR     SHOWSUM           BANK ON DSKY

0286    REF   8 LAST 268        11,2401  0 4102 0  DOFCSTST TC       POSTJUMP
0287    REF   1                 11,2402   14000 1           CADR     FCSSTART
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P0288          SET UP FOR RADAR SAMPLING.

0289  REF   7 LAST 257                         E7          EBANK= RSTKLOC

0290  REF   1               11,2403  3 2472 1  FSTRSAMP CAF      RSTKLIST           HIGH SPEED SAMPLING. SWITCH TO SPECIAL
0291  REF   2 LAST 158      11,2404  54 411 1           TS       DNLSTADR           DOWNLIST.
0292  REF  53 LAST 257      11,2405  4 7657 0           CS       ONE                WANTS TM BUFFERING.
0293  REF   1               11,2406  1 2411 0           TCF      RSAMPTST

0294  REF   6 LAST 267      11,2407  0 5317 1  REGRSAMP TC       GRABWAIT
0295  REF   1               11,2410  3 2473 0           CAF      1SEC+1             SHOWS NO TM BUFFERING.

0296  REF 421 LAST 267      11,2411  54 142 1  RSAMPTST TS       MPAC +2
0297                        11,2412  0 0004 0           INHINT
0298  REF   1               11,2413  4 2474 0           CS       LRPOSCAL           INITIALIZE SCALE AND LR POSITION BITS.
0299  REF  69 LAST 255      11,2414  7 0413 0           MASK     RADMODES
0300  REF  70 LAST 269      11,2415  54 413 0           TS       RADMODES

0301  REF   2 LAST 269      11,2416  3 2474 1           CAF      LRPOSCAL
0302                        11,2417  0 0006 1           EXTEND
0303                        11,2420  02 033 0           RAND     33
0304  REF  71 LAST 269      11,2421  26 413 0           ADS      RADMODES

0305                        11,2422  0 0003 1           RELINT
0306  REF   1               11,2423  3 2444 1           CAF      LRTSTDEX
0307  REF  11 LAST 217      11,2424  54 003 0           TS       EBANK
0308  REF 422 LAST 269      11,2425  56 142 0           XCH      MPAC +2
0309  REF   3 LAST 257      11,2426  55'435 0           TS       RSAMPDT            HI SPEED NNZ - LO SPEED PNZ.
0310  REF  91 LAST 266      11,2427  3 7665 0           CAF      ZERO
0311  REF   4 LAST 256      11,2430  55'434 1           TS       RTSTLOC
0312  REF   2 LAST 256      11,2431  55'436 0           TS       RFAILCNT           ZERO BAD SAMPLE COUNTER.
0313  REF   1               11,2432  3 2470 0           CAF      HISPMAX
0314  REF   2 LAST 256      11,2433  55'432 1           TS       RTSTMAX

0315  REF   1               11,2434  3 2471 1           CAF      RTSTNV
0316  REF  14 LAST 267      11,2435  0 5332 0           TC       NVSBWAIT
0317  REF  11 LAST 267      11,2436  0 5140 1           TC       ENDIDLE
0318  REF   2 LAST 267      11,2437  0 4437 0           TC       EJFREE             ON TERMINATE.
0319  REF   1               11,2440  1 2475 1           TCF      RSEMIAUT           PROCEED MEANS SEMI-AUTO SEQUENCING.
0320  REF   6 LAST 265      11,2441  0 5401 1  RDRDFREE TC       FREEDSP
0321  REF   4 LAST 269      11,2442  11'435 0           CCS      RSAMPDT            SEE IF HI OR LO SPEED SAMPLING.
0322                        11,2443  1 2447 0           TCF      +4

0323  REF   3 LAST 257      11,2444   03431 1  LRTSTDEX ECADR    RTSTDEX

0324  REF   9 LAST 268      11,2445  0 4102 0           TC       POSTJUMP           EXEC. OTHERWISE, SET UP WAITLIST TIMING.
0325  REF   3 LAST 257      11,2446   21274 0           CADR     DORSAMP

0326  REF   6 LAST 257      11,2447  3 6162 1           CAF      SIX                FIND OUT WHICH RADAR WANTED.
0327  REF   4 LAST 269      11,2450  7 1431 1           MASK     RTSTDEX
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L        EXTENDED VERBS                                                                  USER'S OWN PAGE NO.  13

 0328    REF 180 LAST 267     11,2451  10 000 0            CCS      A
 0329    REF   1              11,2452  1 2456 0            TCF      LRCYCLE         LANDING RADAR ARE SERIALS 2 - 5.

 0330    REF   2 LAST 256     11,2453  55'433 0            TS       RTSTBASE        FOR RR BASE = 0, MAX = 1.
 0331    REF   7 LAST 269     11,2454  3 6162 1            CAF      SIX
 0332                         11,2455  1 2461 1            TCF      +4

 0333    REF  27 LAST 262     11,2456  3 7656 0  LRCYCLE   CAF      TWO             FOR LR BASE = 2, MAX = 3.
 0334    REF   3 LAST 270     11,2457  55'433 0            TS       RTSTBASE
 0335    REF   1              11,2460  3 2467 0            CAF      18R

 0336    REF   3 LAST 269     11,2461  55'432 1   +4       TS       RTSTMAX
 0337                         11,2462  0 0004 0            INHINT
 0338    REF  26 LAST 256     11,2463  0 4536 0            TC       WAITLIST
 0339                         11,2464   03254 1            2CADR    RADSAMP
C0339    REF   2 LAST 256     11,2465   20007 1
 0340    REF  19 LAST 267     11,2466  0 4440 0            TC       ENDOFJOB

 0341                         11,2467   00022 1  18R       DEC      18
 0342                         11,2470   00102 1  HISPMAX   DEC      66
 0343                         11,2471   02101 0  RTSTNV    OCT      2101
 0344    REF   1              11,2472   02253 1  RSTKLIST  GENADR   FSTRADTM
 0345                         11,2473   00145 1  1SEC+1    DEC      101
 0346                         11,2474   00444 0  LRPOSCAL  OCT      444
```

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P0347             SEMI-AUTO RADAR TESTING.

 0348                             11,2475  0 0004 0  RSEMIAUT INHINT
 0349    REF    2 LAST 256        11,2476  3 4523 1           CAF      PRIO25            START HI SPEED SAMPLING.
 0350    REF    7 LAST 256        11,2477  0 4363 0           TC       NOVAC
 0351                             11,2500   03274 0           2CADR    DORSAMP
C0351    REF    4 LAST 269        11,2501   20007 1
 0352                             11,2502  0 0003 1           RELINT
 0353    REF    3 LAST 159        11,2503  3 7664 1           CAF      FIVE              SEQUENCE THROUGH ALL SIX CHANNELS.
 0354    REF    5 LAST 269        11,2504  55'431 1   -1      TS       RTSTDEX

 0355    REF    1                 11,2505  3 2523 1  33PASTE  CAF      RV33              ON ENTER, SWITCH TO NEXT CHANNEL.
 0356    REF   15 LAST 269        11,2506  0 5332 0           TC       NVSBWAIT
 0357    REF    2 LAST 219        11,2507  0 5274 0           TC       FLASHON
 0358    REF   12 LAST 269        11,2510  0 5140 1           TC       ENDIDLE
 0359    REF    1                 11,2511  0 2516 1           TC       ENDRTST           ON TERMINATE.
 0360                             11,2512  1 2514 1           TCF      +2
 0361    REF    1                 11,2513  1 2505 1           TCF      33PASTE           DONT ACCEPT DATA.

 0362    REF    6 LAST 271        11,2514  11'431 1           CCS      RTSTDEX
 0363    REF    2 LAST 271        11,2515  1 2504 0           TCF      33PASTE -1

 0364    REF   92 LAST 269        11,2516  3 7665 0  ENDRTST  CAF      ZERO              ENDTEST.
 0365    REF    5 LAST 269        11,2517  55'435 0           TS       RSAMPDT
 0366    REF    2 LAST 267        11,2520  0 4667 1           TC       NEWMODEX
 0367                             11,2521   00000 1           OCT      0
 0368    REF    3 LAST 269        11,2522  0 4437 0           TC       EJFREE

 0369                             11,2523   03300 1  RV33     OCT      3300
```

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P0370             AGS INITIALIZATION PROGRAM.

 0371   REF   2 LAST 151      11,2524  10 412 1  AGSINIT  CCS     AGSWORD        ZERO IF AGS NOT NOW BEING INITIALIZED.
 0372   REF  14 LAST 267      11,2525  0 2066 0           TC      ALM/END        DO IT LATER.

 0373   REF   3 LAST 216      11,2526  3 0025 0           CA      TIME1
 0374   REF   1               11,2527  6 2564 1           AD      12SECS
 0375   REF  64 LAST 266      11,2530  54 001 1           TS      L
 0376   REF   1               11,2531  0 2546 1           TC      SENDIT

 0377                         11,2532  0 0004 0           INHINT                 T1 WILL OVERFLOW, DELAY FOR 12 SECS
 0378   REF   2 LAST 272      11,2533  3 2564 1           CA      12SECS
 0379   REF   3 LAST 272      11,2534  54 412 1           TS      AGSWORD
 0380   REF  27 LAST 270      11,2535  0 4536 0           TC      WAITLIST
 0381                         11,2536   02541 0           2CADR   AGSJOB
C0381   REF   1               11,2537   22007 0
 0382   REF  20 LAST 270      11,2540  0 4440 0           TC      ENDOFJOB

 0383   REF   1               11,2541  3 4526 1  AGSJOB   CAF     PRIO30         ENTER AGSINIT JOB VIA EXEC
 0384   REF   8 LAST 271      11,2542  0 4363 0           TC      NOVAC
 0385                         11,2543   02546 1           2CADR   SENDIT
C0385   REF   2 LAST 272      11,2544   22007 0
 0386   REF  21 LAST 256      11,2545  0 4602 1           TC      TASKOVER

 0387                         11,2546  0 0004 0  SENDIT   INHINT
 0388   REF   1               11,2547  3 2565 0           CAF     LAGSLIST       SWITCH TO SPECIAL DOWNLIST FOR 10 SECS.
 0389   REF   3 LAST 269      11,2550  56 411 0           XCH     DNLSTADR
 0390   REF   4 LAST 272      11,2551  54 412 1           TS      AGSWORD        TO SHOW INITIALIZATION IN PROGRESS.

 0391   REF   1               11,2552  3 2563 0           CAF     10SECS
 0392   REF  28 LAST 272      11,2553  0 4536 0           TC      WAITLIST
 0393                         11,2554   02557 1           2CADR   AGSINIT2
C0393   REF   1               11,2555   22007 0
 0394   REF  21 LAST 272      11,2556  1 4440 1           TCF     ENDOFJOB

 0395   REF  93 LAST 271      11,2557  3 7665 0  AGSINIT2 CAF     ZERO           END OF INITIALIZATION.
 0396   REF   5 LAST 272      11,2560  56 412 0           XCH     AGSWORD
 0397   REF   4 LAST 272      11,2561  54 411 1           TS      DNLSTADR       REVERT TO ORIGINAL DOWNLIST.
 0398   REF  22 LAST 272      11,2562  1 4602 0           TCF     TASKOVER

 0399                         11,2563   01750 1  10SECS   DEC     1000
 0400                         11,2564   02260 1  12SECS   DEC     1200
 0401   REF   1               11,2565   02001 1  LAGSLIST GENADR  AGSLIST
```

```
P0402             VB 43  IMU ATTITUDE ERROR METER LOADER.

 0403  REF   8 LAST 265     11,2566  0 2040 1  IMUATTCK TC      TESTXACT
 0404  REF   1              11,2567  4 2631 0           CS      OCT50K             REMOVE COARSE AND ECTR ENABLE.
 0405                       11,2570  0 0006 1           EXTEND
 0406                       11,2571  03 012 1           WAND    12

 0407  REF   7 LAST 269     11,2572  0 5317 1           TC      GRABWAIT
 0408  REF   2 LAST 261     11,2573  3 2152 0           CAF     VNLODCDU
 0409  REF  16 LAST 271     11,2574  0 5332 0           TC      NVSBWAIT
 0410  REF  13 LAST 271     11,2575  0 5140 1           TC      ENDIDLE
 0411  REF   7 LAST 265     11,2576  0 2055 0           TC      TERMEXTV
 0412                       11,2577  0 2600 0           TC      +1
 0413  REF   1              11,2600  3 2632 1           CAF     V43K               REDISPLAY OUR VERB.
 0414  REF  17 LAST 273     11,2601  0 5332 0           TC      NVSBWAIT
 0415  REF  24 LAST 254     11,2602  3 7652 1           CAF     BIT6               ENABLE ERROR COUNTER.
 0416                       11,2603  0 0006 1           EXTEND
 0417                       11,2604  05 012 1           WOR     12
 0418  REF  28 LAST 270     11,2605  3 7656 0           CAF     TWO
 0419                       11,2606  0 0004 0           INHINT
 0420  REF  29 LAST 272     11,2607  0 4536 0           TC      WAITLIST           PUT OUT COMMAND IN .32 SECS.
 0421                       11,2610   02613 1           2CADR   ATTCK2
C0421  REF   1              11,2611   22007 0
 0422  REF   8 LAST 273     11,2612  1 2055 1           TCF     TERMEXTV           FREES DISPLAY.

 0423  REF  29 LAST 273     11,2613  3 7656 0  ATTCK2   CAF     TWO                PUT OUT ALL COMMANDS - CDU WILL DO LIMIT
 0424  REF 140 LAST 262     11,2614  54 002 1           TS      Q                  INCASE OF EXCESS DATA.
 0425  REF 181 LAST 270     11,2615  50 000 1           INDEX   A
 0426  REF   4 LAST 262     11,2616  3 0400 0           CA      THETAD
 0427                       11,2617  0 0006 1           EXTEND
 0428  REF  20 LAST 254     11,2620  7 7643 0           MP      BIT13              SHIFT RIGHT 2.
 0429  REF 141 LAST 273     11,2621  50 002 0           INDEX   Q
 0430  REF   3 LAST 193     11,2622  54 050 0           TS      CDUXCMD
 0431  REF 142 LAST 273     11,2623  10 002 1           CCS     Q
 0432  REF   2 LAST 273     11,2624  1 2614 1           TCF     ATTCK2 +1

 0433  REF   1              11,2625  3 2633 0           CAF     OCT70K
 0434                       11,2626  0 0006 1           EXTEND
 0435                       11,2627  05 014 1           WOR     14
 0436  REF  23 LAST 272     11,2630  1 4602 0           TCF     TASKOVER

 0437                       11,2631   00050 1  OCT50K   OCT     50
 0438                       11,2632   04300 0  V43K     OCT     4300
 0439                       11,2633   70000 0  OCT70K   OCT     70000
```

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L       EXTENDED VERBS                                                                USER'S OWN PAGE NO.  17

P0449             PROGRAM TO SCAN CHANNELS 30 - 32 FOR CHANGES IN SELECTED INBITS. CALLED BY SPECIAL VERB.

 0451   REF   1                               E7                EBANK= MSGCNT

 0452   REF  22 LAST 251    11,2634  3 7657 1  SETUPMSG CAF     BIT1                BEGIN SCAN.
 0453                       11,2635  0 0004 0           INHINT
 0454   REF  30 LAST 273    11,2636  0 4536 0           TC      WAITLIST
 0455                       11,2637   02644 0           2CADR   MSGSCAN +2
C0455   REF   1             11,2640   22007 0
 0456   REF  22 LAST 272    11,2641  0 4440 0           TC      ENDOFJOB

 0457   REF   8 LAST 241    11,2642  0 4554 1  MSGSCAN  TC      FIXDELAY
 0458                       11,2643   00062 0           DEC     50

 0459   REF  30 LAST 273    11,2644  3 7656 0           CAF     TWO                 SCAN ALL 3 CHANNELS FOR CHANGES.
 0460   REF   2 LAST 274    11,2645  55'606 1           TS      MSGCNT
 0461   REF 182 LAST 273    11,2646  50 000 1           INDEX   A
 0462   REF   1             11,2647  3 1603 0           CA      LAST30              OLD VALUE OF INBITS.
 0463                       11,2650  0 0006 1           EXTEND
 0464   REF   3 LAST 274    11,2651  5 1606 0           INDEX   MSGCNT
 0465                       11,2652  06 030 1           RXOR    30
 0466   REF   4 LAST 274    11,2653  51'606 0           INDEX   MSGCNT
 0467   REF   1             11,2654  7 2724 0           MASK    30MSGMSK
 0468                       11,2655  0 0006 1           EXTEND
 0469   REF   1             11,2656  1 2721 0           BZF     NOMSG

 0470   REF 143 LAST 273    11,2657  54 002 1           TS      Q                   SAVE DIFFERENCE.
 0471   REF   5 LAST 274    11,2660  51'606 0           INDEX   MSGCNT
 0472   REF   2 LAST 274    11,2661  23'603 0           LXCH    LAST30              UPDATE OLD VALUE.
 0473                       11,2662  0 0006 1           EXTEND
 0474   REF  65 LAST 272    11,2663  06 001 0           RXOR    L
 0475   REF   6 LAST 274    11,2664  51'606 0           INDEX   MSGCNT
 0476   REF   3 LAST 274    11,2665  55'603 1           TS      LAST30

 0477                       11,2666  4 0000 0           COM
 0478   REF 144 LAST 274    11,2667  56 002 0           XCH     Q
 0479   REF 145 LAST 274    11,2670  7 0002 1           MASK    Q                   SEE IF ANY OF CHANGED BITS JUST ON.
 0480                       11,2671  0 0006 1           EXTEND
 0481   REF   2 LAST 274    11,2672  1 2721 0           BZF     NOMSG               NO MESSAGE IF SO.

 0482   REF  56 LAST 274    11,2673  54 001 1           TS      L
 0483   REF   7 LAST 274    11,2674  3 1606 0           CA      MSGCNT
 0484                       11,2675  6 0000 1           DOUBLE
 0485                       11,2676  6 0000 1           DOUBLE
 0486   REF  11 LAST 259    11,2677  7 7655 1           MASK    BIT3
 0487   REF  67 LAST 274    11,2700  7 0001 1           MASK    L
 0488                       11,2701  0 0006 1           EXTEND
 0489   REF   1             11,2702  1 2714 0           BZF     NOTRHC

 0490   REF   8 LAST 270    11,2703  3 6162 1           CAF     SIX
```

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L       EXTENDED VERBS                                                                    USER'S OWN PAGE NO.  18

 0491   REF  31 LAST 274    11,2704  0 4536 0            TC      WAITLIST
 0492   REF   1                                E6            EBANK=  PCOM
 0493                       11,2705   03264 1            2CADR   RHCNTRL
C0493   REF   1             11,2706   22006 1
 0494   REF   3 LAST 267    11,2707  3 7642 0            CAF     PRIO20            INITIATE MONITOR.
 0495   REF   9 LAST 272    11,2710  0 4363 0            TC      NOVAC
 0496                       11,2711   02733 1            2CADR   RHCMON
C0496   REF   1             11,2712   22007 0
 0497   REF   3 LAST 274    11,2713  1 2721 0            TCF     NOMSG

 0498   REF   1             11,2714  3 2727 1  NOTRHC    CAF     OKT30
 0499   REF   8 LAST 274    11,2715  6 1606 0            AD      MSGCNT
 0500   REF  22 LAST 218    11,2716  54 075 1            TS      RUPTREG2

 0501   REF 146 LAST 274    11,2717  4 0002 1            CS      Q
 0502   REF   1             11,2720  0 2745 0            TC      VMESSAGE

 0503   REF   9 LAST 275    11,2721  11'606 1  NOMSG     CCS     MSGCNT
 0504   REF   2 LAST 274    11,2722  1 2645 0            TCF     MSGSCAN +3
 0505   REF   3 LAST 275    11,2723  1 2642 1            TCF     MSGSCAN

 0506                       11,2724   00017 1  30MSGMSK  OCT     17
 0507                       11,2725   77777 0            OCT     77777
 0508                       11,2726   03777 0            OCT     3777

 0509                       11,2727   00030 1  OKT30     OCT     30
 0510   REF   1             11,2730  0 2740 0  DESCBITS  TC      MESSAGE           DESCENT BITS COME HERE IN A.
 0511                       11,2731   00016 0            OCT     16
 0512   REF  10 LAST 249    11,2732  0 4606 0            TC      RESUME

 0513   REF   8 LAST 273    11,2733  0 5317 1  RHCMON    TC      GRABWAIT          FIRE UP DSKY MONITOR.
 0514   REF   1             11,2734  3 2737 0            CAF     RHCMONVN
 0515   REF  18 LAST 273    11,2735  0 5332 0            TC      NVSBWAIT
 0516   REF   4 LAST 271    11,2736  0 4437 0            TC      EJFREE

 0517                       11,2737   01645 1  RHCMONVN  OCT     1645
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P0518              MESSAGE DISPLAY - 3 COMPONENT OCTAL.

 0519   REF  23 LAST 275       11,2740   54 075 1  MESSAGE  TS       RUPTREG2          NEW CHANNEL CONTENTS ARRIVE IN A.
 0520   REF 147 LAST 275       11,2741   50 002 0           INDEX    Q                 CHANNEL NUMBER IN OCTAL AT CALLER +1.
 0521                          11,2742   3 0000 1           CAF      0
 0522   REF 148 LAST 276       11,2743   24 002 0           INCR     Q
 0523   REF  24 LAST 276       11,2744   56 075 0           XCH      RUPTREG2

 0524   REF  22 LAST 204       11,2745   54 074 0  VMESSAGE TS       RUPTREG1          FOR VARIABLE CHANNEL.
 0525                          11,2746   0 0006 1           EXTEND
 0526   REF   7 LAST 206       11,2747   22 076 0           QXCH     RUPTREG3
 0527   REF   1                11,2750   3 4525 1           CAF      PRIO27            FIRE UP SPECIAL JOB.
 0528   REF  10 LAST 275       11,2751   0 4363 0           TC       NOVAC
 0529                          11,2752    02763 1           2CADR    DOMSG
C0529   REF   1                11,2753    22007 0
 0530   REF  23 LAST 276       11,2754   52 075 1           DXCH     RUPTREG1          NEW CONTENTS TO MPAC - CHANNEL NUMBER TO
 0531   REF  21 LAST 225       11,2755   50 071 1           INDEX    LOCCTR            MPAC +1.
 0532   REF 423 LAST 269       11,2756   52 141 1           DXCH     MPAC
 0533   REF   4 LAST 272       11,2757   3 0025 0           CA       TIME1
 0534   REF  22 LAST 276       11,2760   50 071 1           INDEX    LOCCTR
 0535   REF 424 LAST 276       11,2761   54 142 1           TS       MPAC +2
 0536   REF   8 LAST 276       11,2762   0 0076 0           TC       RUPTREG3

 0537   REF   9 LAST 275       11,2763   0 5317 1  DOMSG    TC       GRABWAIT
 0538                          11,2764   0 0006 1           EXTEND
 0539   REF 425 LAST 276       11,2765   3 0141 0           DCA      MPAC
 0540   REF   2 LAST 266       11,2766   52 334 1           DXCH     DSPTEM1
 0541   REF 426 LAST 276       11,2767   3 0142 0           CA       MPAC +2
 0542   REF   3 LAST 276       11,2770   54 335 0           TS       DSPTEM1 +2
 0543   REF   1                11,2771   3 3000 1           CAF      MSGVN
 0544   REF   2 LAST 225       11,2772   0 5107 1           TC       NVSUB
 0545   REF   1                11,2773   1 2775 1           TCF      MSGBUSY
 0546   REF   5 LAST 275       11,2774   0 4437 0           TC       EJFREE

 0547                          11,2775   3 2777 1  MSGBUSY  CAF      +2
 0548   REF   1                11,2776   0 5327 1           TC       NVSUBUSY
 0549   REF   2 LAST 276       11,2777    22764 1           CADR     DOMSG +1

 0550                          11,3000    00535 1  MSGVN    OCT      0535
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P0551          ROUTINE FOR AURORA ONLY TO ASK OPERATOR IF RR LOCK ON REQUESTED.

 0553  REF   2 LAST 207    11,3001  0 4112 1  AURLOKON TC      MAKECADR
 0554  REF   6 LAST 240    11,3002  54 427 1           TS      DESRET
 0555  REF   2 LAST 271    11,3003  3 2523 1           CAF     RV33             ASSUMES DSKY GRABBED.
 0556  REF  19 LAST 275    11,3004  0 5332 0           TC      NVSBWAIT
 0557  REF   3 LAST 271    11,3005  0 5274 0           TC      FLASHON
 0558  REF  14 LAST 273    11,3006  0 5140 1           TC      ENDIDLE
 0559                      11,3007  1 3012 0           TCF     +3               ON TERM.
 0560  REF   2 LAST 245    11,3010  3 7653 0           CAF     LOKONFLG
 0561                      11,3011  1 3013 1           TCF     +2
 0562  REF  94 LAST 272    11,3012  3 7665 0           CAF     ZERO
 0563                      11,3013  0 0004 0           INHINT
 0564  REF  18 LAST 245    11,3014  56 061 0           XCH     STATE
 0565  REF   1             11,3015  7 3027 0           MASK    -LOKONFG
 0566  REF  19 LAST 277    11,3016  26 061 1           ADS     STATE

 0567  REF   3 LAST 277    11,3017  7 7653 1           MASK    LOKONFLG         IF NO LOCK-ON CALLED FOR, SET BIT15 OF
 0568  REF 183 LAST 274    11,3020  10 000 0           CCS     A                RADMODES TO INDICATE THAT ARBITRARILY-
 0569                      11,3021  1 3024 0           TCF     +3               LONG DESIGNATION IS WANTED (TO BE

 0570  REF  18 LAST 250    11,3022  3 7641 0           CAF     BIT15            TERMINATED BY FRESH START).
 0571  REF  72 LAST 269    11,3023  26 413 0           ADS     RADMODES

 0572                      11,3024  0 0003 1           RELINT
 0573  REF   7 LAST 277    11,3025  3 0427 0           CA      DESRET
 0574  REF   4 LAST 267    11,3026  1 4105 0           TCF     BANKJUMP

 0575                      11,3027   77757 1  -LOKONFG OCT     -20
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P0576              PROGRAM TO RUN DISPLAY INERTIAL DATA TEST.

 0577    REF    1              11,3030  3 3120 1  DISINDT  CAF     FLVELVN            ASK FOR FORWARD, LATERAL VELOCITY.
 0578    REF   20 LAST 277     11,3031  0 5332 0           TC      NVSBWAIT
 0579    REF   15 LAST 277     11,3032  0 5140 1           TC      ENDIDLE
 0580    REF    1              11,3033  1 3055 0           TCF     ENDDISIN
 0581                          11,3034  1 3035 0           TCF     +1
 0582    REF    1              11,3035  3 3121 0           CAF     ALT,R,VN           ASK FOR INITIAL AND FINIAL ALTITUDES AND
 0583    REF   21 LAST 278     11,3036  0 5332 0           TC      NVSBWAIT           ALTITUDE RATE.
 0584    REF   16 LAST 278     11,3037  0 5140 1           TC      ENDIDLE
 0585    REF    2 LAST 278     11,3040  1 3055 0           TCF     ENDDISIN
 0586                          11,3041  1 3042 0           TCF     +1

 0587                          11,3042  0 0004 0           INHINT
 0588    REF   54 LAST 269     11,3043  4 7657 0           CS      ONE
 0589    REF    5 LAST 166     11,3044  54 351 1           TS      DIDFLG

 0590                          11,3045  0 0006 1           EXTEND
 0591    REF    4 LAST 165     11,3046  3 0353 1           DCA     ALT                SO FOLLOWING MONITOR WORKS.
 0592    REF   11 LAST 165     11,3047  52 365 0           DXCH    ALTSAVE

 0593    REF   55 LAST 278     11,3050  3 7657 1           CAF     ONE
 0594    REF   32 LAST 275     11,3051  0 4536 0           TC      WAITLIST
 0595                          11,3052   03063 1           2CADR   DISINLUP +2
C0595    REF    1              11,3053   22007 0
 0596    REF    6 LAST 276     11,3054  1 4437 1           TCF     EJFREE

 0597    REF    7 LAST 269     11,3055  0 5401 1  ENDDISIN TC      FREEDSP
 0598    REF    3 LAST 271     11,3056  0 4667 1   +1      TC      NEWMODEX
 0599                          11,3057   00000 1           OCT     0

 0600    REF   23 LAST 274     11,3060  0 4440 0           TC      ENDOFJOB
```

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P0601               WATCH ALTSAVE FOR END OF PROBLEM.

 0602   REF   9 LAST 274     11,3061  0 4554 1  DISINLUP TC      FIXDELAY
 0603                        11,3062   00062 0           DEC     50

 0604                        11,3063  0 0006 1   +2      EXTEND
 0605   REF   1              11,3064  3 0356 1           DCA     FINALT
 0606   REF  42 LAST 253     11,3065  52 066 0           DXCH    ITEMP1
 0607                        11,3066  0 0006 1           EXTEND
 0608   REF  12 LAST 278     11,3067  4 0365 0           DCS     ALTSAVE          LATEST ALTITUDE.
 0609   REF  43 LAST 279     11,3070  20 066 0           DAS     ITEMP1

 0610   REF  44 LAST 279     11,3071  10 065 0           CCS     ITEMP1
 0611   REF   1              11,3072  1 3112 1           TCF     +DIF
 0612                        11,3073  1 3075 1           TCF     +2
 0613   REF   1              11,3074  1 3116 0           TCF     -DIF

 0614   REF  17 LAST 235     11,3075  10 066 0           CCS     ITEMP2
 0615   REF   2 LAST 279     11,3076  1 3112 1           TCF     +DIF
 0616                        11,3077  1 3101 0           TCF     +2
 0617   REF   2 LAST 279     11,3100  1 3116 0           TCF     -DIF

 0618   REF  95 LAST 277     11,3101  3 7665 0  DISINDUN CAF     ZERO
 0619   REF   3 LAST 166     11,3102  54 354 1           TS      ALTRATE
 0620   REF   2 LAST 279     11,3103  52 356 0           DXCH    FINALT
 0621   REF   5 LAST 278     11,3104  52 353 0           DXCH    ALT
 0622   REF   4 LAST 275     11,3105  3 7642 0           CAF     PRIO20
 0623   REF  11 LAST 276     11,3106  0 4363 0           TC      NOVAC
 0624                        11,3107   03056 1           2CADR   ENDDISIN +1
C0624   REF   3 LAST 278     11,3110   22007 0
 0625   REF  24 LAST 273     11,3111  1 4602 0           TCF     TASKOVER

 0626   REF   4 LAST 279     11,3112  3 0354 0  +DIF     CA      ALTRATE
 0627                        11,3113  0 0006 1           EXTEND
 0628   REF   1              11,3114  6 3101 1           BZMF    DISINDUN
 0629   REF   2 LAST 278     11,3115  1 3061 1           TCF     DISINLUP

 0630   REF   5 LAST 279     11,3116  4 0354 1  -DIF     CS      ALTRATE
 0631   REF   3 LAST 279     11,3117  1 3113 0           TCF     +DIF +1

 0632                        11,3120   02444 1  FLVELVN  OCT     2444
 0633                        11,3121   02564 1  ALT,R,VN OCT     2564

 0638                        11,3122  0 0004 0  MINIMP   INHINT
 0639   REF  23 LAST 245     11,3123  4 7646 0           CS      BIT10            BIT 10 OF DAPBOOLS INDICATES MINIMP MODE
 0640   REF   9 LAST 188     11,3124  7 0765 1           MASK    DAPBOOLS
 0641   REF  24 LAST 279     11,3125  6 7646 1           AD      BIT10
 0642   REF  10 LAST 279     11,3126  54 765 1           TS      DAPBOOLS         BIT 10 OF DAPBOOLS NOW PRESENT.
 0643   REF  24 LAST 278     11,3127  1 4440 1           TCF     ENDOFJOB
 0644                        11,3130   0 0004 0  NOMINIMP INHINT
 0645   REF  25 LAST 279     11,3131   4 7646 0           CS       BIT10
 0646   REF  11 LAST 279     11,3132   7 0765 1           MASK     DAPBOOLS
 0647   REF  12 LAST 280     11,3133  54 765 1            TS       DAPBOOLS      A ZERO IN POSITION 10 OF DAPBOOLS NOW.

 0648                        11,3134   0 0006 1           EXTEND
 0649   REF   8 LAST 222     11,3135   3 0033 1           DCA      CDUX
 0650   REF   1              11,3136  52 775 0            DXCH     CDUXD
 0651   REF   7 LAST 222     11,3137   3 0034 0           CA       CDUZ
 0652   REF   1              11,3140  54 776 0            TS       CDUZD
 0653   REF  25 LAST 279     11,3141   1 4440 1           TCF      ENDOFJOB
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P0654      V3 60 PREPARE FOR STANDBY OPERATION

R0655      ROUTINE WRITTEN FOR TEST ROPES ONLY*** MUST BE UPDATED TO INCLUDE
R0656                                      FLIGHT REQUIREMENTS FOR FLIGHT OPERATION

 0657      REF  39 LAST 159                         E3               EBANK= LST1

 0658      REF   1                 11,3142   3 3263 0  PRESTAND CAF      EBANK3          COMES HERE FROM LST2FAN
 0659      REF  12 LAST 269        11,3143   56 003 1           XCH      EBANK           SET UP EBANK FOR BANK 3
 0660                              11,3144   0 0004 0           INHINT
 0661      REF   5 LAST 276        11,3145   3 0025 0           CA       TIME1
 0662      REF   1                 11,3146   55,502 0           TS       TIMESAV         THIS ROUTINE WILL LOOK AT TIME1 UNTIL
 0663      REF   2 LAST 275        11,3147   3 2727 1           CAF      OKT30            TIME1 IS INCREMENTED, THEN IT WILL
 0664      REF   1                 11,3150   55'506 1  LONGER   TS       TIMAR           SNATCH THE MISSION TIME REGS AND STORE
 0665      REF   2 LAST 281        11,3151   4 1502 0           CS       TIMESAV         THEN IN TIMESAV FOR LATER ISE IN ARITH.
 0666      REF   6 LAST 281        11,3152   6 0025 0           AD       TIME1           OPERATIONS WHICH SHOULD FIND THE
 0667                              11,3153   0 0006 1           EXTEND                   STANDING DIFFERENCE BETWEEN THE SCALAR
 0668      REF   1                 11,3154   1 3161 0           BZF      CHKTIME         AND THE TIME1-TIME2S REGS.

 0669                              11,3155   0 0006 1           EXTEND
 0670      REF   5 LAST 266        11,3156   3 0025 0           DCA      TIME2           READ AND STORE THE DP TIME AND GO
 0671      REF   3 LAST 281        11,3157   53'503 1           DXCH     TIMESAV         READ THE SCALAR USING THE EXISTING PROG
 0672      REF   1                 11,3160   1 3167 0           TCF      CATCHFIN        FINETIME.

 0673      REF   2 LAST 281        11,3161   11'506 1  CHKTIME  CCS      TIMAR           MUST WATCH THE TIME SPENT IN INHINT OR
 0674      REF   1                 11,3162   0 3150 0           TC       LONGER          THE COPS MIGHT CATCH US.
 0675                              11,3163   0 0003 1           RELINT
 0676      REF  17 LAST 157        11,3164   10 067 1           CCS      NEWJOB
 0677      REF   2 LAST 126        11,3165   0 4404 0           TC       CHANG1
 0678      REF   2 LAST 281        11,3166   0 3147 0           TC       LONGER -1       GO BACK AND LOOK AGAIN

 0679      REF   1                 11,3167   0 5470 1  CATCHFIN TC       FINETIME        WILL READ CHANNELS 3 AND 4 AND RETURN
 0680      REF   1                 11,3170   53'505 1           DXCH     SCALSAV         WITH 3 IN A AND 4 IN L..
 0681                              11,3171   0 0003 1           RELINT
 0682      REF  19 LAST 250        11,3172   4 7654 0           CS       BIT4
 0683      REF  52 LAST 205        11,3173   7 0367 1           MASK     IMODES30        INHIBIT THE IMU FAIL LIGHT.
 0684      REF  20 LAST 281        11,3174   6 7654 1           AD       BIT4
 0685      REF  53 LAST 281        11,3175   54 367 1           TS       IMODES30

 0686      REF  21 LAST 281        11,3176   3 7654 1           CAF      BIT4            SET ALL CHAN 12 BITS EXCEPT C/A TO ZERO.
 0687                              11,3177   0 0006 1           EXTEND                   THIS IS NECESSARY SO THAT THE GIMBALS DO
 0688                              11,3200   03 012 1           WAND     12              NOT DRIFT INTO GIMBALLOCK IF THE SYSTEM

 0689      REF  22 LAST 281        11,3201   3 7654 1           CAF      BIT4            SHOULD BE IN OPERATE AT THE TIME STBY
 0690                              11,3202   0 0006 1           EXTEND                   WAS STARTED.  THIS SECTION WILL MAKE
 0691                              11,3203   05 012 1           WOR      12              SURE THE IMU IS IN C/A.....

 0692      REF  19 LAST 249        11,3204   3 7645 1           CAF      BIT11           WHEN BIT 11 IS PRESENT IN CHANNEL 13 THE
 0693                              11,3205   0 0006 1           EXTEND                   DSKY PB, CAN THEN ENERGIZE THE STANDBY
 0694                              11,3206   05 013 0           WOR      13              RELAY IN THE CGC PWR SUPPLIES....
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L        EXTENDED VERBS                                                     USER'S OWN PAGE NO.  25

 0695    REF  26 LAST 280       11,3207  0 4440 0          TC       ENDOFJOB        GO TO DUMMY JOB UNTIL YOU DIE...
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P0696     VB 61 RECOVER FROM STANDBY OPERATION

R0697    ROUTINE WRITTEN FOR TEST ROPES ONLY**** MUST BE UPDATED TO INCLUDE
R0698                   FLIGHT REQUIREMENTS FOR FLIGHT OPERATIONS SEQUENCES....

 0699    REF   2 LAST 281      11,3210  3 3263 0  POSTAND  CAF    EBANK3          COMES HERE FROM LST2FAN
 0700    REF  13 LAST 281      11,3211  56 003 1           XCH    EBANK           SET UP EBANK FOR BANK 3
 0701    REF   2 LAST 281      11,3212  0 5470 1           TC     FINETIME
 0702    REF   3 LAST 281      11,3213  53'507 0           DXCH   TIMAR           READ THE SCALAR AND SEE IF IT OVERFLOW-
 0703                          11,3214  0 0003 1           RELINT                 ED WHILE THE CGC WAS IN STBY, IF SO
 0704    REF   4 LAST 283      11,3215  31'506 0           CAE    TIMAR           THE OVERFLOW MUST BE ADDED OR IT WILL
 0705                          11,3216  0 0006 1           EXTEND                 SEEM THAT THE REALATIVITY THEORY WORKS
 0706    REF   2 LAST 281      11,3217  61'504 1           SU     SCALSAV         BETTER THAN IT SHOULD...
 0707                          11,3220  0 0006 1           EXTEND
 0708    REF   1               11,3221  6 3244 0           BZMF   ADDTIME         IF ITS NEG. IT MUST HAVE OV:FLWD..

 0709    REF   7 LAST 264      11,3222  0 6000 1           TC     INTPRET
 0710                          11,3223   45345 1           DLOAD  DSU             IF IT DID NOT OV-FLW. FIND OUT HOW LONG
 0711    REF   5 LAST 283      11,3224   01507 1                  TIMAR           THE CGC WAS IN STBY BY SUBTRACTING THE
 0712    REF   3 LAST 283      11,3225   01505 0                  SCALSAV         SCALAR AT THE START OF STBY FROM THE
 0713                          11,3226   45061 1           SRR    RTB             SCALAR AT THE END OF STBY AND THEN ADD
 0714                          11,3227   01606 0                  5               THE DIFFERENCE TO THE TIME EXISTING
 0715    REF   1               11,3230   33406 0                  SGNAGREE        WHEN THE SCALAR WAS READ AT STBY ENTRY**
 0716                          11,3231   77615 0           DAD
 0717    REF   4 LAST 281      11,3232   01503 0                  TIMESAV
 0718    REF   6 LAST 283      11,3233   01507 1           STORE  TIMAR
 0719                          11,3234   77776 1           EXIT

 0720                          11,3235  0 0006 1  CORCTTIM EXTEND
 0721    REF   7 LAST 283      11,3236  3 1507 1           DCA    TIMAR           THIS IS THE CORRECTED TIME TO BE READ
 0722    REF   6 LAST 281      11,3237  52 025 1           DXCH   TIME2           INTO TIME1 AND TIME2 REGS. ADDR 24-25

 0723    REF  20 LAST 281      11,3240  4 7645 0           CS     BIT11
 0724                          11,3241  0 0006 1           EXTEND                 DISABLE THE DSKY STBY PUSHBUTTON.
 0725                          11,3242  03 013 0           WAND   13
 0726    REF  27 LAST 282      11,3243  0 4440 0           TC     ENDOFJOB

 0727                          11,3244  0 0006 1  ADDTIME  EXTEND
 0728    REF   1               11,3245  3 7637 1           DCA    DPOSMAX         IF THE SCALAR OVERFLOWED, FIND OUT HOW
 0729    REF   1               11,3246  53'511 1           DXCH   TIMEDIFF        MUCH TIME REMAINED WHEN READ THE FIRST
 0730    REF   8 LAST 283      11,3247  0 6000 1           TC     INTPRET         TIME AND THEN ADD THE PRESENT READING-
 0731                          11,3250   45345 1           DLOAD  DSU             WHICH WILL BE THE TOTAL TIME SPENT IN
 0732    REF   2 LAST 283      11,3251   01511 0                  TIMEDIFF        STANDBY, TO WHICH THE TIME AT STBY
 0733    REF   4 LAST 283      11,3252   01505 0                  SCALSAV         MAY BE ADDED TO FIND THE PRESENT TIME
 0734                          11,3253   54215 0           DAD    SRR             CORRECT TO 10 MSEC..
 0735    REF   8 LAST 283      11,3254   01507 1                  TIMAR           **** THE TIME IN STANDBY MODE MUST NOT
 0736                          11,3255   01606 0                  5               EXCEED 23 HOURS IF TIME IS TO BE
 0737                          11,3256   77615 0           DAD                    CORRECTLY COMPUTED BY THIS ROUTINE.*****
 0738    REF   5 LAST 283      11,3257   01503 0                  TIMESAV
 0739    REF   9 LAST 283      11,3260   01507 1           STORE  TIMAR
 0740                           11,3261   77776 1              EXIT
 0741    REF   1                11,3262   0 3235 0             TC        CORCTTIM

 0742                           11,3263   01400 1   EBANK3     OCT       01400            CONST USED TO SET EBANK REG FOR BANK 3

 0743                                     11,3264   ENDEXTVS   EQUALS
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L       KEYRUPT, UPRUPT                                                                 USER'S OWN PAGE NO.   1

 0001                               07,2362               BANK    7

 0002   REF   6 LAST 248   07,2362  54 016 1  KEYRUPT1 TS      BANKRUPT
 0003   REF 149 LAST 276   07,2363  56 002 0           XCH     Q
 0004   REF   7 LAST 248   07,2364  54 012 0           TS      QRUPT
 0005   REF   1            07,2365  0 5257 1           TC      LODSAMPT      TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0006   REF   3 LAST 267   07,2366  3 5224 0           CAF     LOW5
 0007                      07,2367  0 0006 1           EXTEND
 0008   REF   1            07,2370  02 015 1           RAND    MNKEYIN
 0009   REF  13 LAST 226   07,2371  54 077 0  KEYCOM   TS      RUPTREG4
 0010   REF   1            07,2372  3 5233 0           CAF     CHRPRIO
 0011   REF  12 LAST 279   07,2373  0 4363 0           TC      NOVAC
 0012   REF   2 LAST 158                   E0          EBANK=  DSPCOUNT
 0013                      07,2374   02002 1           2CADR   CHARIN
C0013   REF   1            07,2375   10000 0
 0014   REF  14 LAST 285   07,2376  3 0077 1           CA      RUPTREG4
 0015   REF  23 LAST 276   07,2377  50 071 1           INDEX   LOCCTR
 0016   REF 427 LAST 276   07,2400  54 140 0           TS      MPAC          LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
 0017   REF  11 LAST 275   07,2401  0 4606 0           TC      RESUME
```

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L        KEYRUPT, UPRUPT                                                                       USER'S OWN PAGE NO.   2

P0018    UPRUPT PROGRAM

 0019    REF   7 LAST 285     07,2402   54 016 1  UPRUPT    TS       BANKRUPT
 0020    REF 150 LAST 285     07,2403   56 002 0            XCH      Q
 0021    REF   8 LAST 285     07,2404   54 012 0            TS       QRUPT
 0022    REF   2 LAST 285     07,2405   0 5257 1            TC       LODSAMPT            TIME IS SNATCHED IN RUPT FOR NOUN 65.
 0023    REF  96 LAST 279     07,2406   3 7665 0            CAF      ZERO
 0024    REF   2 LAST 157     07,2407   56 045 0            XCH      INLINK
 0025    REF   2 LAST  28     07,2410   54 077 0            TS       KEYTEMP1
 0026    REF  12 LAST 274     07,2411   3 7655 0            CAF      BIT3                TURN ON UPACT LIGHT
 0027                         07,2412   0 0006 1            EXTEND                       (BIT 3 OF CHANNEL 11)
 0028    REF   4 LAST 137     07,2413   05 011 1            WOR      DSALMOUT
 0029    REF   4 LAST 285     07,2414   3 5224 0  UPRPT1    CAF      LOW5                TEST FOR TRIPLE CHAR REDUNDANCY
 0030    REF   3 LAST 286     07,2415   7 0077 0            MASK     KEYTEMP1            LOW5 OF WORD
 0031    REF   4 LAST 286     07,2416   56 077 1            XCH      KEYTEMP1            LOW5 INTO KEYTEMP1
 0032    REF  16 LAST 125     07,2417   56 021 1            XCH      SR                  WHOLE WORD INTO SR
 0033    REF   1              07,2420   55'070 0            TS       KEYTEMP2            ORIGINAL SR INTO KEYTEMP2
 0034    REF   1              07,2421   0 2465 1            TC       SRGHT5
 0035    REF   5 LAST 286     07,2422   7 5224 1            MASK     LOW5                MID 5
 0036    REF   1              07,2423   6 2477 1            AD       HI10
 0037    REF   1              07,2424   0 2474 1            TC       UPTEST
 0038    REF   2 LAST 286     07,2425   0 2465 1            TC       SRGHT5
 0039    REF   6 LAST 286     07,2426   7 5224 1            MASK     LOW5                HIGH 5
 0040                         07,2427   4 0000 0            COM
 0041    REF   2 LAST 286     07,2430   0 2474 1            TC       UPTEST
 0042    REF   1              07,2431   0 2461 0  UPOK      TC       RESTORSR            CODE IS GOOD
 0043    REF   1              07,2432   4 2436 0            CS       ELRCODE             IF CODE = ERROR LIGHT RESET, PUT +0
 0044    REF   5 LAST 286     07,2433   6 0077 1            AD       KEYTEMP1            INTO BIT1 OF UPLOCK.
 0045    REF 184 LAST 277     07,2434   10 000 0            CCS      A                   IF CODE NOT= ELR, PASS CODE ONLY IF
 0046    REF   1              07,2435   0 2444 1            TC       TSTUPLOK            BIT1 OF UPLOCK = 0.
 0047                         07,2436    00022 1  ELRCODE   OCT      22
 0048    REF   2 LAST 286     07,2437   0 2444 1            TC       TSTUPLOK
 0049    REF  23 LAST 274     07,2440   4 7657 0            CS       BIT1                PUT 0 INTO BIT1 OF UPLOCK
 0050    REF   2 LAST 151     07,2441   7 0342 0            MASK     UPLOCK
 0051    REF   3 LAST 286     07,2442   54 342 0            TS       UPLOCK
 0052    REF   1              07,2443   0 2450 1            TC       ACCEPTUP
 0053    REF  24 LAST 286     07,2444   3 7657 1  TSTUPLOK  CAF      BIT1
 0054    REF   4 LAST 286     07,2445   7 0342 0            MASK     UPLOCK
 0055    REF 185 LAST 286     07,2446   10 000 0            CCS      A
 0056    REF  12 LAST 285     07,2447   0 4606 0            TC       RESUME              BIT1 OF UPLOCK = 1.
 0057    REF   6 LAST 286     07,2450   56 077 1  ACCEPTUP  XCH      KEYTEMP1            BIT1 OF UPLOCK = 0.
 0058    REF   1              07,2451   0 2371 0            TC       KEYCOM

 0059    REF   2 LAST 286     07,2452   0 2461 0  TMFAIL2   TC       RESTORSR            CODE IS BAD
 0060    REF  25 LAST 286     07,2453   4 7657 0            CS       BIT1                LOCK OUT FURTHER UPLINK ACTIVITY (BY
 0061    REF   5 LAST 286     07,2454   7 0342 0            MASK     UPLOCK              PUTTING 1 INTO BIT1 OF UPLOCK) UNTIL ELR
 0062    REF  26 LAST 286     07,2455   6 7657 1            AD       BIT1                IS SENT UP UPLINK.
 0063    REF   6 LAST 286     07,2456   54 342 0            TS       UPLOCK
 0064    REF   1              07,2457   0 4606 0  TMFAIL1   TC       TMALM
 0065    REF  13 LAST 286     07,2460   0 4606 0            TC       RESUME
```

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L       KEYRUPT, UPRUPT                                                                     USER'S OWN PAGE NO.   3

 0066   REF   2 LAST 286      07,2461  57 070 1  RESTORSR XCH      KEYTEMP2
 0067                         07,2462  6 0000 1           DOUBLE
 0068   REF  17 LAST 286      07,2463  54 021 0           TS       SR
 0069   REF 151 LAST 286      07,2464  0 0002 0           TC       Q

 0070   REF  14 LAST 286                  4606  TMALM     =        RESUME           FOR NOW

 0071   REF  18 LAST 287      07,2465  4 0021 0  SRGHT5   CS       SR
 0072   REF  19 LAST 287      07,2466  4 0021 0           CS       SR
 0073   REF  20 LAST 287      07,2467  4 0021 0           CS       SR
 0074   REF  21 LAST 287      07,2470  4 0021 0           CS       SR
 0075   REF  22 LAST 287      07,2471  4 0021 0           CS       SR
 0076   REF 186 LAST 286      07,2472  4 0000 0           CS       A
 0077   REF 152 LAST 287      07,2473  0 0002 0           TC       Q                DELIVERS WORD UNCOMPLEMENTED

 0078   REF   7 LAST 286      07,2474  6 0077 1  UPTEST   AD       KEYTEMP1
 0079   REF 187 LAST 287      07,2475  10 000 0           CCS      A
 0080   REF   1               07,2476  0 2452 0           TC       TMFAIL2
 0081                         07,2477    77740 1  HI10     OCT      77740
 0082   REF   2 LAST 287      07,2500  0 2452 0           TC       TMFAIL2
 0083   REF 153 LAST 287      07,2501  0 0002 0           TC       Q

R0084   UPACT IS TURNED OFF BY VBRELDSP, ALSO BY ERROR LIGHT RESET.
```

```
L       KEYRUPT, UPRUPT                                                     USER'S OWN PAGE NO.   4

R0085   THE RECEPTION OF A BAD CODE BY UPLINK LOCKS OUT FURTHER UPLINK ACTIVITY
R0086   BY PLACING A 1 INTO BIT1 OF UPLOCK. BIT9 (ALONG WITH BIT11) OF TMKEYBUF
R0087   IS SET TO 1 TO SEND AN INDICATION OF THIS SITUATION DOWN THE DOWNLINK.
R0088   THE UPLINK INTERLOCK IS ALLOWED WHEN AN ERROR LIGHT RESET CODE IS SENT
R0089   UP THE UPLINK, OR WHEN A FRESH START IS PERFORMED.


 0090                             07,2502  ENDKRURS EQUALS
```

```
L       PINBALL GAME  BUTTONS AND LIGHTS                                    USER'S OWN PAGE NO.   1

R0001   KEYBOARD AND DISPLAY PROGRAM


R0002   THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COUTESY OF THE AUTHORS.

R0003        ::IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT
R0004   USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
R0005   CHRISTIAN EAR CAN ENDURE TO HEAR.::

R0006                       HENRY 6, ACT 2, SCENE 4


R0007   THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE


R0008   RESERVED FOR PINBALL EXECUTIVE ACTION

R0009   DSPCOUNT ERASE                      DISPLAY POSITION INDICATOR
R0010   DECBRNCH ERASE                      +DEC, - DEC, OCT INDICATOR
R0011   VERBREG  ERASE                      VERB CODE
R0012   NOUNREG  ERASE                      NOUN CODE
R0013   XREG     ERASE                      R1 INPUT BUFFER
R0014   YREG     ERASE                      R2 INPUT BUFFER
R0015   ZREG     ERASE                      R3 INPUT BUFFER
R0016   XREGLP   ERASE                      LO PART OF XREG (FOR DEC CONV ONLY)
R0017   YREGLP   ERASE                      LO PART OF YREG (FOR DEC CONV ONLY)
R0018   ZREGLP   ERASE                      LO PART OF ZREG (FOR DEC CONV ONLY)
R0019   MODREG   ERASE                      MODE CODE
R0020   DSPLOCK  ERASE                      KEYBOARD/SUBROUTINE CALL INTERLOCK
R0021   REQRET   ERASE                      RETURN REGISTER FOR LOAD
R0022   LOADSTAT ERASE                      STATUS INDICATOR FOR LOADTST
R0023   CLPASS   ERASE                      PASS INDICATOR CLEAR
R0024   NOUT     ERASE                      ACTIVITY COUNTER FOR DSPTAB
R0025   NOUNCADR ERASE                      MACHINE CADR FOR NOUN
R0026   MONSAVE  ERASE                      N/V CODE FOR MONITOR. (= MONSAVE1-1)
R0027   MONSAVE1 ERASE                      NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R0028   DSPTAB   ERASE          +13D        0-10,DISPLAY PANEL BUFFER.11-13,C RELAYS
R0029   CADRSTOR ERASE                      ENDIDLE STORAGE
R0030   GRABLOCK ERASE                      INTERNAL INTERLOCK FOR DISPLAY SYSTEM
R0031   NVQTEM   ERASE                      NVSUB STORAGE FOR CALLING ADDRESS
R0032                                       MUST = NVBNKTEM-1
R0033   NVBNKTEM ERASE                      NVSUB STORAGE FOR CALLING BANK
R0034                                       MUST = NVQTEM+1
R0035   DSPLIST  ERASE          +2          WAITING LIST FOR DSP SYST INTERNAL USE
R0036   EXTVBACT REASE                      EXTENDED VERB ACTIVITY INTERLOCK
R0037   DSPTEM1  ERASE          +2          BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0038   DSPTEM2  ERASE          +2          BUFFER STORAGE AREA 2 (MOSTLY FOR DEG)
```

```
R0039    END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION



R0040    TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R0041    DSEXIT    =      INTB15+              RETURN FOR DSPIN
R0042    EXITEM    =      INTB15+              RETURN FOR SCALE FACTOR ROUTINE SELECT
R0043    BLANKRET  =      INTB15+              RETURN FOR 2BLANK

R0044    WRDRET    =      INTBIT15             RETURN FOR 5BLANK
R0045    WDRET     =      INTBIT15             RETURN FOR DSPWD
R0046    DECRET    =      INTBIT15             RETURN FOR PUTCOM(DEC LOAD)
R0047    21/22REG  =      INTBIT15             TEMP FOR CHARIN

R0048    UPDATRET  =      POLISH               RETURN FOR UPDATNN, UPDATVB
R0049    CHAR      =      POLISH               TEMP FOR CHARIN
R0050    ERCNT     =      POLISH               COUNTER FOR ERROR LIGHT RESET
R0051    DECOUNT   =      POLISH               COUNTER FOR SCALING AND DISPLAY (DEC)

R0052    SGNON     =      VBUF                 TEMP FOR +,- ON
R0053    NOUNTEM   =      VBUF                 COUNTER FOR MIXNOUN FETCH
R0054    DISTEM    =      VBUF                 COUNTER FOR OCTAL DISPLAY VERBS
R0055    DECTEM    =      VBUF                 COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0056    SGNOFF    =      VBUF     +1          TEMP FOR +,- ON
R0057    NVTEMP    =      VBUF     +1          TEMP FOR NVSUB
R0058    SFTEMP1   =      VBUF     +1          STORAGE FOR SF CONST HI PART(=SFTEMP2-1)

R0059    CODE      =      VBUF     +2          FOR DSPIN
R0060    SFTEMP2   =      VBUF     +2          STORAGE FOR SF CONST LO PART(=SFTEMP1+1)

R0061    MIXTEMP   =      VBUF     +3          FOR MIXNOUN DATA
R0062    SIGNRET   =      VBUF     +3          RETURN FOR +,- ON

R0063    ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

R0064    ENTRET    =      DOTINC               EXIT FROM ENTER

R0065    WDCNT     =      DOTRET               CHAR COUNTER FOR DSPWD
R0066    INREL     =      DOTRET               INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R0067    DSPMMTEM  =      MATINC               DSPCOUNT SAVE FOR DSPMM
R0068    MIXBR     =      MATINC               INDICATOR FOR MIXED OR NORMAL NOUN

R0069    TEM1      ERASE                       EXEC TEMP
R0070    DSREL     =      TEM1                 REL ADDRESS FOR DSPIN

R0071    TEM2      ERASE                       EXEC TEMP
R0072    DSMAG     =      TEM2                 MAGNITUDE STORE FOR DSPIN
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R0073   IDADDTEM =       TEM2              MIXNOUN INDIRECT ADDRESS STORAGE

R0074   TEM3     ERASE                     EXEC TEMP
R0075   COUNT    =       TEM3              FOR DSPIN

R0076   TEM4     ERASE                     EXEC TEMP
R0077   LSTPTR   =       TEM4              LIST POINTER FOR GRABUSY
R0078   RELRET   =       TEM4              RETURN FOR RELDSP
R0079   FREERET  =       TEM4              RETURN FOR FREEDSP

R0080   TEM5     ERASE                     EXEC TEMP
R0081   NOUNADD  =       TEM5              TEMP STORAGE FOR NOUN ADDRESS

R0082   NNADTEM  ERASE                     TEMP FOR NOUN ADDRESS TABLE ENTRY
R0083   NNTYPTEM ERASE                     TEMP FOR NOUN TYPE TABLE ENTRY
R0084   IDAD1TEM ERASE                     TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0085                                      MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0086   IDAD2TEM ERASE                     TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0087                                      MUST = IDAD1TEM+1, = IDAD3TEM-1.
R0088   IDAD3TEM ERASE                     TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0089                                      MUST = IDAD1TEM+2, = IDAD2TEM+1.
R0090   RUTMXTEM ERASE                     TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0091   END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION



R0092   RESERVED FOR PINBALL INTERRUPT ACTION

R0093   DSPCNT   ERASE                     COUNTER FOR DSPOUT
R0094   UPLOCK   ERASE                     BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0095                                                                RECEPTION OF A BAD MESSAGE IN UPLINK)
R0096   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION



R0097   TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0098   KEYTEMP1 =       WAITEXIT          TEMP FOR KEYRUPT, UPRUPT
R0099   DSRUPTEM =       WAITEXIT          TEMP FOR DSPOUT
R0100   KEYTEMP2 =       RUPTAGN           TEMP FOR KEYRUPT, UPRUPT
R0101   END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
```

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L        PINBALL GAME  BUTTONS AND LIGHTS                                   USER'S OWN PAGE NO.   4

P0102    THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE,
R0103    0           10000
R0104    1           00001
R0105    9           01001
R0106    VERB        10001
R0107    ERROR RES10010
R0108    KEY RLSE 11001
R0109    +           11010
R0110    -           11011
R0111    ENTER       11100
R0112    CLEAR       11110
R0113    NOUN        11111


R0114    OUTPUT FORMAT FOR DISPLAY PANEL. SET OUT0 TO  AAAABCCCCCDDDDD.
R0115    A-S SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0116    ENERGIZED.
R0117    B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0118    C-S  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0119    D-S  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0120    THE PANEL APPEARS AS FOLLOWS,
R0121    MD1      MD2                                (MAJOR MODE)
R0122    VD1      VD2 (VERB)      ND1      ND2       (NOUN)
R0123    R1D1     R1D2     R1D3   R1D4     R1D5      (R1)
R0124    R2D1     R2D2     R2D3   R2D4     R2D5      (R2)
R0125    R3D1     R3D2     R3D3   R3D4     R3D5      (R3)

R0126    EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0127    MD1    25      R2D1  11          ALL ARE OCTAL
R0128    MD2    24      R2D2  10
R0129    VD1    23      R2D3   7
R0130    VD2    22      R2D4   6
R0131    ND1    21      R2D5   5
R0132    ND2    20      R3D1   4
R0133    R1D1   16      R3D2   3
R0134    R1D2   15      R3D3   2
R0135    R1D3   14      R3D4   1
R0136    R1D4   13      R3D5   0
R0137    R1D5   12


R0138    THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0139    DSPTAB RELAYWD        BIT11      BITS 10-6      BITS 5-1
R0140    RELADD
R0141    10       1011                    MD1   (25)     MD2   (24)
R0142    9        1010                    VD1   (23)     VD2   (22)
```

```
R0143   8      1001                     ND1   (21)      ND2   (20)
R0144   7      1000                                     R1D1  (16)
R0145   6      0111           +R1       R1D2  (15)      R1D3  (14)
R0146   5      0110           -R1       R1D4  (13)      R1D5  (12)
R0147   4      0101           +R2       R2D1  (11)      R2D2  (10)
R0148   3      0100           -R2       R2D3  (7)       R2D4  (6)
R0149   2      0011                     R2D5  (5)       R3D1  (4)
R0150   1      0010           +R3       R3D2  (3)       R3D3  (2)
R0151   0      0001           -R3       R3D4  (1)       R3D5  (0)
R0152          0000   NO RELAYWORD


R0153   THE 5 BIT RELAY CODES ARE,
R0154   BLANK        00000
R0155   0            10101
R0156   1            00011
R0157   2            11001
R0158   3            11011
R0159   4            01111
R0160   5            11110
R0161   6            11100
R0162   7            10011
R0163   8            11101
R0164   9            11111
```

```
L      PINBALL GAME  BUTTONS AND LIGHTS                                          USER,S OWN PAGE NO.   6

P0165  START OF EXECUTIVE SECTION OF PINBALL


0166                                  04,2000           SETLOC 20000

0167   REF    1             04,2000  0 3454 1  GRABUSYB TC      GRABUSY1       STANDARD LEAD INS. DONT MOVE.
0168   REF    1             04,2001  0 3476 1  NVSUBSYB TC      NVSUBSY1

0169   REF   56 LAST 278    04,2002  3 7657 1  CHARIN   CAF     ONE            BLOCK DISPLAY SYST
0170   REF    2 LAST 157    04,2003  56 277 0           XCH     DSPLOCK        MAKE DSP SYST BUSY, BUT SAVE OLD
0171   REF    1             04,2004  54 101 0           TS      21/22REG       C(DSPLOCK) FOR ERROR LIGHT RESET.
0172   REF  428 LAST 285    04,2005  56 140 1           XCH     MPAC
0173   REF    1             04,2006  54 103 1           TS      CHAR
0174   REF  188 LAST 287    04,2007  50 000 1           INDEX   A
0175                        04,2010  0 2011 0           TC      +1             INPUT CODE    FUNCTION
0176   REF    1             04,2011  0 3275 1           TC      CHARALRM       0
0177   REF    1             04,2012  0 2062 1           TC      NUM            1
0178   REF    2 LAST 294    04,2013  0 2062 1           TC      NUM            2
0179   REF    3 LAST 294    04,2014  0 2062 1           TC      NUM            3
0180   REF    4 LAST 294    04,2015  0 2062 1           TC      NUM            4
0181   REF    5 LAST 294    04,2016  0 2062 1           TC      NUM            5
0182   REF    6 LAST 294    04,2017  0 2062 1           TC      NUM            6
0183   REF    7 LAST 294    04,2020  0 2062 1           TC      NUM            7
0184   REF    1             04,2021  0 2053 0           TC      89TEST         10            8
0185   REF    2 LAST 294    04,2022  0 2053 0           TC      89TEST         11            9
0186   REF    2 LAST 294    04,2023  0 3275 1           TC      CHARALRM       12
0187   REF    3 LAST 294    04,2024  0 3275 1           TC      CHARALRM       13
0188   REF    4 LAST 294    04,2025  0 3275 1           TC      CHARALRM       14
0189   REF    5 LAST 294    04,2026  0 3275 1           TC      CHARALRM       15
0190   REF    6 LAST 294    04,2027  0 3275 1           TC      CHARALRM       16
0191   REF    7 LAST 294    04,2030  0 3275 1           TC      CHARALRM       17
0192   REF    8 LAST 294    04,2031  0 2060 0           TC      NUM      -2    20            0
0193   REF    1             04,2032  0 2235 1           TC      VERB           21            VERB
0194   REF    1             04,2033  0 2343 1           TC      ERROR          22            ERROR LIGHT RESET
0195   REF    8 LAST 294    04,2034  0 3275 1           TC      CHARALRM       23
0196   REF    9 LAST 294    04,2035  0 3275 1           TC      CHARALRM       24
0197   REF   10 LAST 294    04,2036  0 3275 1           TC      CHARALRM       25
0198   REF   11 LAST 294    04,2037  0 3275 1           TC      CHARALRM       26
0199   REF   12 LAST 294    04,2040  0 3275 1           TC      CHARALRM       27
0200   REF   13 LAST 294    04,2041  0 3275 1           TC      CHARALRM       30
0201   REF    1             04,2042  0 3320 0           TC      VBRELDSP       31            KEY RELEASE
0202   REF    1             04,2043  0 2267 0           TC      POSGN          32            +
0203   REF    1             04,2044  0 2254 0           TC      NEGSGN         33            -
0204   REF    1             04,2045  0 2051 1           TC      ENTERJMP       34            ENTER
0205   REF   14 LAST 294    04,2046  0 3275 1           TC      CHARALRM       35
0206   REF    1             04,2047  0 2431 0           TC      CLEAR          36            CLEAR
0207   REF    1             04,2050  0 2250 1           TC      NOUN           37            NOUN
```

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 0208    REF  10 LAST 269      04,2051   0 4102 0  ENTERJMP TC       POSTJUMP
 0209    REF   1               04,2052    12003 1           CADR     ENTER

 0210    REF   5 LAST 255      04,2053   3 6165 0  89TEST   CAF      THREE
 0211    REF   1               04,2054   7 0265 1           MASK     DECBRNCH
 0212    REF 189 LAST 294      04,2055  10 000 0            CCS      A
 0213    REF   9 LAST 294      04,2056   0 2062 1           TC       NUM                  IF DECBRNCH IS +, 8 OR 9 OK
 0214    REF  15 LAST 294      04,2057   0 3275 1           TC       CHARALRM             IF DECBRNCH IS +0, REJECT 8 OR 9


R0215    NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0216    WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0217    OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0218    YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0219    DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0220    IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

 0221    REF  97 LAST 286      04,2060   3 7665 0           CAF      ZERO
 0222    REF   2 LAST 294      04,2061  54 103 1            TS       CHAR
 0223    REF   3 LAST 285      04,2062  10 264 0   NUM      CCS      DSPCOUNT
 0224                          04,2063   0 2067 1           TC       +4                   +
 0225                          04,2064   0 2067 1           TC       +3                   +0
 0226                          04,2065   0 2066 0           TC       +1                   -BLOCK DATA IN IF DSPCOUNT IS -
 0227    REF  28 LAST 283      04,2066   0 4440 0           TC       ENDOFJOB             -0
 0228    REF   1               04,2067   0 2205 1           TC       GETINREL
 0229    REF   2 LAST 157      04,2070  10 302 1            CCS      CLPASS               IF CLPASS IS + OR +0, MAKE IT +0.
 0230    REF  98 LAST 295      04,2071   3 7665 0           CAF      ZERO
 0231    REF   3 LAST 295      04,2072  54 302 1            TS       CLPASS
 0232                          04,2073   0 2074 0           TC       +1
 0233    REF   3 LAST 295      04,2074  50 103 0            INDEX    CHAR
 0234    REF   2 LAST 163      04,2075   3 4741 1           CAF      RELTAB
 0235    REF   7 LAST 286      04,2076   7 5224 1           MASK     LOW5
 0236    REF   1               04,2077  54 110 0            TS       CODE
 0237    REF   4 LAST 295      04,2100   3 0264 1           CA       DSPCOUNT
 0238    REF   1               04,2101  54 127 1            TS       COUNT
 0239    REF   1               04,2102   0 3201 1           TC       DSPIN
 0240    REF   6 LAST 295      04,2103   3 6165 0           CAF      THREE
 0241    REF   2 LAST 295      04,2104   7 0265 1           MASK     DECBRNCH
 0242    REF 190 LAST 295      04,2105  10 000 0            CCS      A                    +0, OCTAL.  +1, + DEC.  +2, - DEC.
 0243    REF   1               04,2106   0 2117 1           TC       DECTOBIN             +
 0244    REF   1               04,2107  50 123 1            INDEX    INREL                +0 OCTAL
 0245    REF   2 LAST 157      04,2110  56 266 0            XCH      VERBREG
 0246    REF   4 LAST 110      04,2111  54 022 0            TS       CYL
 0247    REF   5 LAST 295      04,2112   4 0022 0           CS       CYL
 0248    REF   6 LAST 295      04,2113   4 0022 0           CS       CYL
 0249    REF   7 LAST 295      04,2114  56 022 1            XCH      CYL
 0250    REF   4 LAST 295      04,2115   6 0103 0           AD       CHAR
 0251    REF   1               04,2116   0 2134 0           TC       ENDNMTST
 0252    REF   2 LAST 295      04,2117  50 123 1   DECTOBIN INDEX    INREL
 0253   REF   3 LAST 295     04,2120   56 266 0            XCH      VERBREG
 0254   REF 429 LAST 294     04,2121   54 140 0            TS       MPAC              SUM X 2EXP-14 IN MPAC
 0255   REF  99 LAST 295     04,2122   3 7665 0            CAF      ZERO
 0256   REF 430 LAST 296     04,2123   54 141 1            TS       MPAC     +1
 0257   REF   3 LAST 157     04,2124   3 7661 1            CAF      TEN               10 X 2EXP-14
 0258   REF   1              04,2125   0 7266 1            TC       SHORTMP           10SUM X 2EXP-28 IN MPAC, MPAC+1
 0259   REF 431 LAST 296     04,2126   56 141 0            XCH      MPAC     +1
 0260   REF   5 LAST 295     04,2127   6 0103 0            AD       CHAR
 0261   REF 432 LAST 296     04,2130   54 141 1            TS       MPAC     +1
 0262   REF   2 LAST 295     04,2131   0 2134 0            TC       ENDNMTST          NO OF
 0263   REF 433 LAST 296     04,2132   26 140 0            ADS      MPAC              OF MUST BE 5TH CHAR
 0264   REF   1              04,2133   0 2152 0            TC       DECEND
 0265   REF   3 LAST 295     04,2134   50 123 1  ENDNMTST  INDEX    INREL
 0266   REF   4 LAST 296     04,2135   54 266 1            TS       VERBREG
 0267   REF   5 LAST 295     04,2136   4 0264 0            CS       DSPCOUNT
 0268   REF   4 LAST 296     04,2137   50 123 1            INDEX    INREL
 0269   REF   1              04,2140   6 2176 0            AD       CRITCON
 0270                        04,2141   0 0006 1            EXTEND
 0271   REF   1              04,2142   1 2144 0            BZF      ENDNUM            -0, DSPCOUNT = CRITCON
 0272   REF   1              04,2143   0 2173 0            TC       MORNUM            - , DSPCOUNT G/ CRITCON
 0273   REF   7 LAST 295     04,2144   3 6165 0  ENDNUM    CAF      THREE
 0274   REF   3 LAST 295     04,2145   7 0265 1            MASK     DECBRNCH
 0275   REF 191 LAST 295     04,2146   10 000 0            CCS      A
 0276   REF   2 LAST 296     04,2147   0 2152 0            TC       DECEND
 0277   REF   6 LAST 296     04,2150   4 0264 0  ENDALL    CS       DSPCOUNT          BLOCK NUMIN BY PLACING DSPCOUNT
 0278   REF   2 LAST 296     04,2151   0 2174 1            TC       MORNUM   +1       NEGATIVELY
 0279   REF   1              04,2152   0 7063 0  DECEND    TC       DMP               MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
 0280   REF   1              04,2153    02203 1            ADRES    DECON             2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
 0281   REF   8 LAST 296     04,2154   3 6165 0            CAF      THREE             IN MPAC, +1, +2.
 0282   REF   4 LAST 296     04,2155   7 0265 1            MASK     DECBRNCH
 0283   REF 192 LAST 296     04,2156   50 000 1            INDEX    A
 0284                        04,2157   0 2157 0            TC       +0
 0285   REF   1              04,2160   0 2164 0            TC       +DECSGN
 0286                        04,2161   0 0006 1            EXTEND                     - CASE
 0287   REF 434 LAST 296     04,2162   4 0142 1            DCS      MPAC     +1
 0288   REF 435 LAST 296     04,2163   52 142 1            DXCH     MPAC     +1
 0289   REF 436 LAST 296     04,2164   56 142 0  +DECSGN   XCH      MPAC     +2
 0290   REF   5 LAST 296     04,2165   50 123 1            INDEX    INREL
 0291   REF   1              04,2166   54 271 1            TS       XREGLP   -2
 0292   REF 437 LAST 296     04,2167   56 141 0            XCH      MPAC     +1
 0293   REF   6 LAST 296     04,2170   50 123 1            INDEX    INREL
 0294   REF   5 LAST 296     04,2171   54 266 1            TS       VERBREG
 0295   REF   1              04,2172   0 2150 1            TC       ENDALL
 0296   REF   7 LAST 296     04,2173   10 264 0  MORNUM    CCS      DSPCOUNT          DECREMENT DSPCOUNT
 0297   REF   8 LAST 296     04,2174   54 264 0            TS       DSPCOUNT
 0298   REF  29 LAST 295     04,2175   0 4440 0            TC       ENDOFJOB

 0299                        04,2176    00022 1  CRITCON   OCT      22                (DEC 18)
 0300                        04,2177    00020 0            OCT      20                (DEC 16)
 0301                        04,2200    00012 1            OCT      12                (DEC 10)
 0302                        04,2201   00005 1            OCT      5
 0303                        04,2202   00000 1            OCT      0

 0304                        04,2203   05174 0  DECON     2DEC     E-5 B14             2EXP14/10EXP5 = .16384 DEC
C0304                        04,2204   13261 0

R0305  GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0306  PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

 0307  REF   9 LAST 296      04,2205   50 264 1 GETINREL INDEX    DSPCOUNT
 0308  REF   1               04,2206   3 2211 1           CAF      INRELTAB
 0309  REF   7 LAST 296      04,2207   54 123 0           TS       INREL               (A TEMP, REG)
 0310  REF 154 LAST 287      04,2210   0 0002 0           TC       Q

 0311                        04,2211   00004 0  INRELTAB OCT      4                   R3D5 (DSPCOUNT = 0)
 0312                        04,2212   00004 0            OCT      4                   R3D4            =(1)
 0313                        04,2213   00004 0            OCT      4                   R3D3            =(2)
 0314                        04,2214   00004 0            OCT      4                   R3D2            =(3)
 0315                        04,2215   00004 0            OCT      4                   R3D1            =(4)
 0316                        04,2216   00003 1            OCT      3                   R2D5            =(5)
 0317                        04,2217   00003 1            OCT      3                   R2D4            =(6)
 0318                        04,2220   00003 1            OCT      3                   R2D3            =(7)
 0319                        04,2221   00003 1            OCT      3                   R2D2            =(8D)
 0320                        04,2222   00003 1            OCT      3                   R2D1            =(9D)
 0321                        04,2223   00002 0            OCT      2                   R1D5            =(10D)
 0322                        04,2224   00002 0            OCT      2                   R1D4            =(11D)
 0323                        04,2225   00002 0            OCT      2                   R1D3            =(12D)
 0324                        04,2226   00002 0            OCT      2                   R1D2            =(13D)
 0325                        04,2227   00002 0            OCT      2                   R1D1            =(14D)
 0326  REF  13 LAST 136      04,2230   0 5464 1           TC       CCSHOLE             NO DSPCOUNT NUMBER = 15D
 0327                        04,2231   00001 0            OCT      1                   ND2             =(16D)
 0328                        04,2232   00001 0            OCT      1                   ND1             =(17D)
 0329                        04,2233   00000 1            OCT      0                   VD2             =(18D)
 0330                        04,2234   00000 1            OCT      0                   VD1             =(19D)


 0331  REF 100 LAST 296      04,2235   3 7665 0 VERB      CAF      ZERO
 0332  REF   6 LAST 296      04,2236   54 266 1           TS       VERBREG
 0333  REF   2 LAST 158      04,2237   3 5237 1           CAF      VD1
 0334  REF  10 LAST 297      04,2240   54 264 0 NVCOM     TS       DSPCOUNT
 0335  REF   1               04,2241   0 2541 0           TC       2BLANK
 0336  REF 101 LAST 297      04,2242   3 7665 0           CAF      ZERO
 0337  REF   5 LAST 296      04,2243   54 265 1           TS       DECBRNCH
 0338  REF   2 LAST 157      04,2244   54 300 0           TS       REQRET              SET FOR ENTPASO
 0339  REF   1               04,2245   3 5150 0           CAF      ENDINST             IF DSPALARM OCCURS BEFORE FIRST ENTPASO
 0340  REF   1               04,2246   54 122 1           TS       ENTRET              OR NVSUB, ENTRET MUST ALREADY BE SET
A0341                                                                                  TO TC ENDOFJOB
 0342  REF  30 LAST 296      04,2247   0 4440 0           TC       ENDOFJOB
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0343   REF 102 LAST 297     04,2250   3 7665 0  NOUN      CAF     ZERO
0344   REF   3 LAST 259     04,2251  54 267 0             TS      NOUNREG
0345   REF   1              04,2252   3 5240 1            CAF     ND1                  ND1, OCT 21 (DEC 17)
0346   REF   1              04,2253   0 2240 0            TC      NVCOM


0347   REF   1              04,2254   0 2326 1  NEGSGN    TC      SIGNTEST
0348   REF   1              04,2255   0 2313 1            TC      -ON
0349   REF  31 LAST 274     04,2256   3 7656 0            CAF     TWO
0350   REF   8 LAST 297     04,2257  50 123 1   BOTHSGN   INDEX   INREL                SET DEC COMP BIT TO 1 (IN DECBRNCH)
0351   REF  16 LAST 255     04,2260   6 7651 1            AD      BIT7                 BIT 5 FOR R1,  BIT 4 FOR R2,
0352   REF   6 LAST 297     04,2261  26 265 1             ADS     DECBRNCH             BIT 3 FOR R3.
0353   REF   4 LAST 295     04,2262  10 302 1   FIXCLPAS  CCS     CLPASS               IF CLPASS IS + OR +0, MAKE IT +0.
0354   REF 103 LAST 298     04,2263   3 7665 0            CAF     ZERO
0355   REF   5 LAST 298     04,2264  54 302 1             TS      CLPASS
0356                        04,2265   0 2266 1            TC      +1
0357   REF  31 LAST 297     04,2266   0 4440 0            TC      ENDOFJOB

0358   REF   2 LAST 298     04,2267   0 2326 1  POSGN     TC      SIGNTEST
0359   REF   1              04,2270   0 2273 0            TC      +ON
0360   REF  57 LAST 294     04,2271   3 7657 1            CAF     ONE
0361   REF   1              04,2272   0 2257 0            TC      BOTHSGN

0362   REF 155 LAST 297     04,2273  22 002 0   +ON       LXCH    Q
0363   REF   2 LAST 295     04,2274   0 2205 1            TC      GETINREL
0364   REF   9 LAST 298     04,2275  50 123 1             INDEX   INREL
0365   REF   1              04,2276   3 2321 0            CAF     SGNTAB  -2
0366   REF   1              04,2277  54 107 0             TS      SGNOFF
0367   REF  58 LAST 298     04,2300   6 7657 1            AD      ONE
0368   REF   1              04,2301  54 106 1             TS      SGNON
0369   REF 104 LAST 298     04,2302   3 7665 0  SGNCOM    CAF     ZERO
0370   REF   2 LAST 295     04,2303  54 110 0             TS      CODE
0371   REF   2 LAST 298     04,2304  56 107 1             XCH     SGNOFF
0372   REF   1              04,2305   0 3263 0            TC      11DSPIN
0373   REF  21 LAST 283     04,2306   3 7645 1            CAF     BIT11
0374   REF   3 LAST 298     04,2307  54 110 0             TS      CODE
0375   REF   2 LAST 298     04,2310  56 106 0             XCH     SGNON
0376   REF   2 LAST 298     04,2311   0 3263 0            TC      11DSPIN
0377   REF  68 LAST 274     04,2312   0 0001 0            TC      L
0378   REF 156 LAST 298     04,2313  22 002 0   -ON       LXCH    Q
0379   REF   3 LAST 298     04,2314   0 2205 1            TC      GETINREL
0380   REF  10 LAST 298     04,2315  50 123 1             INDEX   INREL
0381   REF   2 LAST 298     04,2316   3 2321 0            CAF     SGNTAB  -2
0382   REF   3 LAST 298     04,2317  54 106 1             TS      SGNON
0383   REF  59 LAST 298     04,2320   6 7657 1            AD      ONE
0384   REF   3 LAST 298     04,2321  54 107 0             TS      SGNOFF
0385   REF   1              04,2322   0 2302 1            TC      SGNCOM

0386                        04,2323    00005 1  SGNTAB    OCT     5                    -R1
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0387                       04,2324   00003 1            OCT      3                    -R2
0388                       04,2325   00000 1            OCT      0                    -R3


0389   REF 157 LAST 298    04,2326   22 002 0  SIGNTEST LXCH     Q                    ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
0390   REF   1             04,2327   4 5175 0           CS       R1D1                 R2D1, OR R3D1.
0391   REF   1             04,2330   0 2336 0           TC       SGNTST1
0392   REF   1             04,2331   4 5176 0           CS       R2D1
0393   REF   2 LAST 299    04,2332   0 2336 0           TC       SGNTST1
0394   REF   1             04,2333   4 5177 1           CS       R3D1
0395   REF   3 LAST 299    04,2334   0 2336 0           TC       SGNTST1
0396   REF  32 LAST 298    04,2335   0 4440 0           TC       ENDOFJOB             NO MATCH FOUND. SIGN ILLEGAL
0397   REF  11 LAST 297    04,2336   6 0264 1  SGNTST1  AD       DSPCOUNT
0398                       04,2337   0 0006 1           EXTEND
0399                       04,2340   1 2342 1           BZF      +2                   MATCH FOUND
0400   REF 158 LAST 299    04,2341   0 0002 0           TC       Q
0401   REF  69 LAST 298    04,2342   0 0001 0           TC       L                    SIGN LEGAL


R0402  ERROR LIGHT RESET (RSET) TURNS OFF,
R0403  UPLINK ACTIVITY, AUTO, HOLD, FREE, NO ATT, OPERATOR ERROR,
R0404  PROG ALM, TRACKER FAIL.
R0405  LEAVES GIMBAL LOCK ALONE.
R0406  IT ALSO ZEROES THE :TEST ALARM: OUT BIT, WHICH TURNS OFF STBY,RESTART.
R0407  IT ALSO SETS :CAUTION RESET: TO 1.
R0408  IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

0409   REF   2 LAST 294    04,2343   56 101 1  ERROR    XCH      21/22REG             RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
0410   REF   3 LAST 294    04,2344   54 277 1           TS       DSPLOCK              LIGHT RESET LEAVES DSPLOCK UNCHANGED.
0411                       04,2345   0 0004 0           INHINT
0412   REF  26 LAST 280    04,2346   3 7646 1           CAF      BIT10                TURN ON :CAUTION RESET: OUTBIT
0413                       04,2347   0 0006 1           EXTEND
0414   REF   5 LAST 286    04,2350   05 011 1           WOR      DSALMOUT             BIT10 CHAN 11
0415   REF  25 LAST 273    04,2351   3 7652 1           CAF      BIT6                 LEAVE GIMBAL LOCK LAMP INTACT,
0416   REF  19 LAST 229    04,2352   7 0322 0           MASK     DSPTAB +11D          TURNING OFF, AUTO, HOLD, FREE, NO ATT.,
0417   REF  19 LAST 277    04,2353   6 7641 0           AD       BIT15                PROG ALARM, AND TRACKER.
0418   REF  20 LAST 299    04,2354   54 322 0           TS       DSPTAB +11D
0419   REF   2 LAST 177    04,2355   4 4515 0           CS       PRIO16               RESET FAIL BITS WHICH GENERATE PROG
0420   REF  10 LAST 229    04,2356   7 0370 1           MASK     IMODES33             ALARM SO THAT IF THE FAILURE STILL
0421   REF   3 LAST 299    04,2357   6 4515 1           AD       PRIO16               EXISTS, THE ALARM WILL COME BACK.
0422   REF  11 LAST 299    04,2360   54 370 1           TS       IMODES33
0423   REF  27 LAST 299    04,2361   4 7646 0           CS       BIT10
0424   REF  54 LAST 281    04,2362   7 0367 1           MASK     IMODES30
0425   REF  28 LAST 299    04,2363   6 7646 1           AD       BIT10
0426   REF  55 LAST 299    04,2364   54 367 1           TS       IMODES30

0427   REF   1             04,2365   4 2427 0           CS       RFAILS
0428   REF  73 LAST 277    04,2366   7 0413 0           MASK     RADMODES
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 0429   REF  17 LAST 298    04,2367  6 7651 1           AD      BIT7
 0430   REF  74 LAST 299    04,2370  54 413 0           TS      RADMODES

 0431   REF  29 LAST 299    04,2371  4 7646 0           CS      BIT10             TURN OFF :TEST ALARM: OUTBIT.
 0432                       04,2372  0 0006 1           EXTEND
 0433   REF   1             04,2373  03 013 0           WAND    CHAN13
 0434   REF   1             04,2374  4 2426 1           CS      ERCON             TURN OFF UPLINK ACTIVITY,
 0435                       04,2375  0 0006 1           EXTEND                    OPERATOR ERROR.
 0436   REF   6 LAST 299    04,2376  03 011 1           WAND    DSALMOUT
 0437   REF   1             04,2377  3 5242 0  TSTAB    CAF     BINCON            (DEC 10)
 0438   REF   1             04,2400  54 103 1           TS      ERCNT             ERCNT = COUNT
 0439                       04,2401  0 0004 0           INHINT
 0440   REF   2 LAST 300    04,2402  50 103 0           INDEX   ERCNT
 0441   REF  21 LAST 299    04,2403  10 307 1           CCS     DSPTAB
 0442   REF  60 LAST 298    04,2404  6 7657 1           AD      ONE
 0443   REF   1             04,2405  0 2412 1           TC      ERPLUS
 0444   REF  61 LAST 300    04,2406  6 7657 1           AD      ONE
 0445   REF 193 LAST 296    04,2407  4 0000 0  ERMINUS  CS      A
 0446   REF   1             04,2410  7 2430 0           MASK    NOTBIT12
 0447   REF   1             04,2411  0 2415 0           TC      ERCOM
 0448   REF 194 LAST 300    04,2412  4 0000 0  ERPLUS   CS      A
 0449   REF   2 LAST 300    04,2413  7 2430 0           MASK    NOTBIT12
 0450   REF 195 LAST 300    04,2414  4 0000 0           CS      A                 MIGHT WANT TO RESET CLPASS, DECBRNCH,
 0451   REF   3 LAST 300    04,2415  50 103 0  ERCOM    INDEX   ERCNT             ETC.
 0452   REF  22 LAST 300    04,2416  54 307 1           TS      DSPTAB
 0453                       04,2417  0 0003 1           RELINT
 0454   REF   4 LAST 300    04,2420  10 103 1           CCS     ERCNT
 0455   REF   1             04,2421  0 2400 1           TC      TSTAB    +1
 0456   REF 105 LAST 298    04,2422  3 7665 0           CAF     ZERO
 0457   REF   2 LAST 151    04,2423  55'363 1           TS      FAILREG
 0458   REF   2 LAST 154    04,2424  55'364 0           TS      SFAIL
 0459   REF  33 LAST 299    04,2425  0 4440 0           TC      ENDOFJOB

 0460                       04,2426   00104 1  ERCON    OCT     104               CHAN 11 BITS 3,7.
A0461                                                                             UPLINK ACTIVITY, AND OPERATOR ERROR.
 0462                       04,2427   00330 1  RFAILS   OCT     330               RADAR CDU AND DATA FAIL FLAGS.
 0463                       04,2430   73777 1  NOTBIT12 OCT     73777


R0464   CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0465   NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0466   L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0467   THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0468   APPROPRIATE TO BE CLEARED.

R0469   CLPASS    +0  PASS0, CAN BE BACKED UP
R0470             +NZ  HIPASS, CAN BE BACKED UP
R0471             -NZ  PASS0, CANNOT BE BACKED UP
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 0472    REF  12 LAST 299     04,2431   10 264 0  CLEAR     CCS      DSPCOUNT
 0473    REF  62 LAST 300     04,2432   6 7657 1            AD       ONE
 0474                         04,2433   0 2435 1            TC       +2
 0475    REF  63 LAST 301     04,2434   6 7657 1            AD       ONE
 0476    REF  13 LAST 301     04,2435   54 264 0            TS       DSPCOUNT        MAG OF DSPCOUNT
 0477    REF   4 LAST 298     04,2436   0 2205 1            TC       GETINREL        MUST SET INREL, EVEN FOR HIPASS
 0478    REF   6 LAST 298     04,2437   10 302 1            CCS      CLPASS
 0479    REF   1              04,2440   0 2446 0            TC       CLPASHI         +
 0480                         04,2441   0 2443 0            TC       +2              +0     IF CLPASS IS +0 OR -, IT IS PASS0
 0481                         04,2442   0 2443 0            TC       +1              -
 0482    REF  11 LAST 298     04,2443   3 0123 1            CA       INREL
 0483    REF   1              04,2444   0 2470 0            TC       LEGALTST
 0484    REF   1              04,2445   0 2463 1            TC       CLEAR1
 0485    REF  12 LAST 301     04,2446   10 123 0  CLPASHI   CCS      INREL
 0486    REF  13 LAST 301     04,2447   54 123 0            TS       INREL
 0487    REF   2 LAST 301     04,2450   0 2470 0            TC       LEGALTST
 0488    REF   1              04,2451   3 2537 1            CAF      DOUBLK +2       +3 TO - NUMBER. BACKS DATA REQUESTS.
 0489    REF   3 LAST 297     04,2452   26 300 0            ADS      REQRET
 0490    REF  14 LAST 301     04,2453   3 0123 1            CA       INREL
 0491    REF   1              04,2454   54 111 1            TS       MIXTEMP         TEMP STORAGE FOR INREL
 0492                         04,2455   0 0006 1            EXTEND
 0493    REF   7 LAST 297     04,2456   26 266 1            DIM      VERBREG         DECREMENT VERB AND RE-DISPLAY
 0494    REF  18 LAST 264     04,2457   0 4063 0            TC       BANKCALL
 0495    REF   1              04,2460    12315 0            CADR     UPDATVB
 0496    REF   2 LAST 301     04,2461   3 0111 0            CA       MIXTEMP
 0497    REF  15 LAST 301     04,2462   54 123 0            TS       INREL           RESTORE INREL
 0498    REF   1              04,2463   0 2466 1  CLEAR1    TC       CLR5
 0499    REF   7 LAST 301     04,2464   24 302 0            INCR     CLPASS          ONLY IF CLPASS IS + OR +0,
 0500    REF  34 LAST 300     04,2465   0 4440 0            TC       ENDOFJOB        SET FOR HIGHER PASS.
 0501    REF 159 LAST 299     04,2466   22 002 0  CLR5      LXCH     Q               USES 5BLANK  BUT AVOIDS ITS TC GETINREL
 0502    REF   1              04,2467   0 2500 0            TC       5BLANK  +2
 0503    REF   1              04,2470   6 7670 1  LEGALTST  AD       NEG2
 0504    REF 196 LAST 300     04,2471   10 000 0            CCS      A
 0505    REF 160 LAST 301     04,2472   0 0002 0            TC       Q               LEGAL  INREL G/ 2
 0506    REF  14 LAST 297     04,2473   0 5464 1            TC       CCSHOLE
 0507    REF  35 LAST 301     04,2474   0 4440 0            TC       ENDOFJOB        ILLEGAL   INREL= 0,1
 0508    REF 161 LAST 301     04,2475   0 0002 0            TC       Q               LEGAL    INREL = 2


R0509    5BLANK BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG,
R0510    YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
R0511    DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

 0512    REF 162 LAST 301     04,2476   22 002 0  5BLANK    LXCH     Q
 0513    REF   5 LAST 301     04,2477   0 2205 1            TC       GETINREL
 0514    REF 106 LAST 300     04,2500   3 7665 0            CAF      ZERO
 0515    REF  16 LAST 301     04,2501   50 123 1            INDEX    INREL
 0516    REF   8 LAST 301     04,2502   54 266 1            TS       VERBREG         ZERO X, Y, Z REG.
 0517    REF  17 LAST 301     04,2503   50 123 1            INDEX    INREL
 0518   REF   2 LAST 296     04,2504  54 271 1            TS      XREGLP  -2
 0519   REF   4 LAST 298     04,2505  54 110 0            TS      CODE
 0520   REF  18 LAST 301     04,2506  50 123 1            INDEX   INREL            ZERO PERTINENT DEC COMP BIT.
 0521   REF  18 LAST 300     04,2507  4 7651 0            CS      BIT7             PROTECT OTHERS
 0522   REF   7 LAST 298     04,2510  7 0265 1            MASK    DECBRNCH
 0523   REF   1              04,2511  7 2540 0            MASK    BRNCHCON         ZERO LOW 2 BITS.
 0524   REF   8 LAST 302     04,2512  54 265 1            TS      DECBRNCH
 0525   REF  19 LAST 302     04,2513  50 123 1            INDEX   INREL
 0526   REF   1              04,2514  3 2530 0            CAF     SINBLANK -2      BLANK ISOLATED CHAR SEPARATELY
 0527   REF   2 LAST 295     04,2515  54 127 1            TS      COUNT
 0528   REF   2 LAST 295     04,2516  0 3201 1            TC      DSPIN
 0529   REF  20 LAST 302     04,2517  50 123 1  5BLANK1   INDEX   INREL
 0530   REF   2 LAST 301     04,2520  3 2533 0            CAF     DOUBLK  -2
 0531   REF  14 LAST 301     04,2521  54 264 0            TS      DSPCOUNT
 0532   REF   2 LAST 297     04,2522  0 2541 0            TC      2BLANK
 0533   REF  32 LAST 298     04,2523  4 7656 1            CS      TWO
 0534   REF  15 LAST 302     04,2524  26 264 0            ADS     DSPCOUNT
 0535   REF   3 LAST 302     04,2525  0 2541 0            TC      2BLANK
 0536   REF  21 LAST 302     04,2526  50 123 1            INDEX   INREL
 0537   REF   2 LAST 299     04,2527  3 5173 1            CAF     R1D1     -2
 0538   REF  16 LAST 302     04,2530  54 264 0            TS      DSPCOUNT         SET DSPCOUNT TO LEFT MOST DSP NUMBER
 0539   REF  70 LAST 299     04,2531  0 0001 0            TC      L                OF REG. JUST BLANKED

 0540                        04,2532   00016 0  SINBLANK OCT     16               DEC 14
 0541                        04,2533   00005 1           OCT     5
 0542                        04,2534   00004 0           OCT     4
 0543                        04,2535   00015 0  DOUBLK   OCT     15               DEC 13
 0544                        04,2536   00011 1           OCT     11               DEC 9
 0545                        04,2537   00003 1           OCT     3

 0546                        04,2540   77774 0  BRNCHCON OCT     77774

R0547   2BLANK BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR  OF THE PAIR INTO
R0548   DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT

 0549   REF  17 LAST 302     04,2541  3 0264 1  2BLANK    CA      DSPCOUNT
 0550   REF  23 LAST 287     04,2542  54 021 0            TS      SR
 0551   REF   1              04,2543  4 2554 0            CS      BLANKCON
 0552                        04,2544  0 0004 0            INHINT
 0553   REF  24 LAST 302     04,2545  50 021 1            INDEX   SR
 0554   REF  23 LAST 300     04,2546  56 307 0            XCH     DSPTAB
 0555                        04,2547  0 0006 1            EXTEND
 0556                        04,2550  6 2552 1            BZMF    +2               IF OLD CONTENTS -, NOUT OK
 0557   REF   5 LAST 163     04,2551  24 303 1            INCR    NOUT             IF OLD CONTENTS +, +1 TO NOUT
 0558                        04,2552  0 0003 1            RELINT                   IF -,NOUT OK
 0559   REF 163 LAST 301     04,2553  0 0002 0            TC      Q
 0560                        04,2554   04000 0  BLANKCON OCT     4000
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P0561   ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TO LOAD
R0562   DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0563   PASSES.

R0564   MACHINE CADR TO BE SPECIFIED (MCTBS) NOUNS DESIRE AN ECADR TO BE LOADED
R0565   WHEN USED WITH LOAD VERBS, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0566   VERB = FIXED MEMORY DISPLAY, WHICH REQUIRES AN FCADR).

 0567                              05,2000                SETLOC  22000

 0568   REF   1              05,2000  0 3344 1  NVSUBB    TC      NVSUB1          STANDARD LEAD INS. DONT MOVE.
 0569   REF   1              05,2001  1 3403 1  DSPMM     TCF     DSPMM1
 0570   REF   1              05,2002  0 2663 0  LOADLV1   TC      LOADLV
A0571                                                                             END OF STANDARD LEAD INS.

 0572   REF 107 LAST 301     05,2003  3 7665 0  ENTER     CAF     ZERO
 0573   REF   8 LAST 301     05,2004 54 302 1             TS      CLPASS
 0574   REF   2 LAST 297     05,2005  3 5150 0            CAF     ENDINST
 0575   REF   2 LAST 297     05,2006 54 122 1             TS      ENTRET
 0576   REF   4 LAST 301     05,2007 10 300 0             CCS     REQRET
 0577   REF   1              05,2010  0 2031 1            TC      ENTPASO         IF +, PASS 0
 0578   REF   2 LAST 303     05,2011  0 2031 1            TC      ENTPASO         IF +, PASS 0
 0579                        05,2012  0 2013 1            TC      +1              IF -, NOT PASS 0
 0580   REF   9 LAST 296     05,2013  3 6165 0            CAF     THREE           IF DEC, ALARM IF LESS THAN 5 CHAR IN,
 0581   REF   9 LAST 302     05,2014  7 0265 1            MASK    DECBRNCH        BUT LEAVE REQRET - AND FLASH ON, SO
 0582   REF 197 LAST 301     05,2015 10 000 0             CCS     A               OPERATOR CAN SUPPLY MISSING NUMERICAL
 0583                        05,2016  0 2020 1            TC      +2              CHARACTERS AND CONTINUE.
 0584   REF   1              05,2017  0 2024 0            TC      ACCEPTWD        OCTAL. ANY NUMBER OF CHAR OK.
 0585   REF  18 LAST 302     05,2020 10 264 0             CCS     DSPCOUNT
 0586   REF   1              05,2021  0 2324 0            TC      GODSPALM        LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0587   REF   2 LAST 303     05,2022  0 2324 0            TC      GODSPALM        LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
 0588                        05,2023  0 2024 0            TC      +1              5 CHAR IN (DSPCOUNT IS -)
 0589   REF   5 LAST 303     05,2024  4 0300 0  ACCEPTWD  CS      REQRET          5 CHAR IN (DSPCOUNT IS -)
 0590   REF   6 LAST 303     05,2025 54 300 0             TS      REQRET          SET REQRET +.
 0591   REF   2 LAST 264     05,2026  0 5300 1            TC      FLASHOFF
 0592   REF   7 LAST 303     05,2027  0 0300 1            TC      REQRET

 0593   REF   3 LAST 303                 0122   ENTEXIT   =       ENTRET

 0594                        05,2030  00030 1   LOWVERB   OCT     30              LOWER VERB THAT AVOIDS NOUN TEST

 0595   REF 108 LAST 303     05,2031  3 7665 0  ENTPASO   CAF     ZERO             NOUN VERB SUB ENTERS HERE
 0596   REF  10 LAST 303     05,2032 54 265 1             TS      DECBRNCH
 0597   REF   9 LAST 301     05,2033  4 0266 1  TESTVB    CS      VERBREG         IF VERB IS 30-77, SKIP NOUN TEST
 0598  REF   1           05,2034  6 2030 0            AD      LOWVERB         30-VB
 0599                    05,2035  0 0006 1            EXTEND
 0600  REF   1           05,2036  6 2116 0            BZMF    VERBFAN         VERB G/E 30
 0601                    05,2037  0 0006 1  TESTNN    EXTEND                  VERB L/ 30
 0602  REF   1           05,2040  3 2076 1            DCA     LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
 0603  REF   1           05,2041  52 006 0            DXCH    Z               ROUTINE.
 0604  REF   1           05,2042  50 124 0            INDEX   MIXBR
 0605                    05,2043  0 2043 1            TC      +0
 0606                    05,2044  0 2046 1            TC      +2              NORMAL
 0607  REF   1           05,2045  0 2176 0            TC      MIXNOUN         MIXED
 0608  REF   1           05,2046  10 132 0            CCS     NNADTEM         NORMAL
 0609  REF   2 LAST 304  05,2047  0 2114 1            TC      VERBFAN -2          NORMAL IF +
 0610  REF   3 LAST 303  05,2050  0 2324 0            TC      GODSPALM        NOT IN USE   IF +0
 0611  REF   1           05,2051  0 2055 0            TC      REQADD          SPECIFY MACHINE CADR IF -
 0612  REF   1           05,2052  24 304 0            INCR    NOUNCADR        AUGMENT MACHINE CADR IF -0
 0613  REF   1           05,2053  0 5167 1            TC      SETNADD         ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 0614  REF   1           05,2054  0 2102 0            TC      INTMCTBS +2
 0615  REF  20 LAST 299  05,2055  3 7641 0  REQADD    CAF     BIT15           SET CLPASS FOR PASS0 ONLY
 0616  REF   9 LAST 303  05,2056  54 302 1            TS      CLPASS
 0617  REF   3 LAST 303  05,2057  4 5150 1            CS      ENDINST         TEST IF REACHED HERE FROM INTERNAL OR
 0618  REF   1           05,2060  6 0122 0            AD      ENTEXIT                   FROM EXTERNAL
 0619                    05,2061  0 0006 1            EXTEND
 0620                    05,2062  1 2064 0            BZF     +2              EXTERNAL MACH CADR TO BE SPECIFIED
 0621  REF   2 LAST 304  05,2063  0 2100 1            TC      INTMCTBS
 0622  REF   1           05,2064  0 2256 1            TC      REQDATZ         EXTERNAL MACH CADR TO BE SPECIFIED
 0623  REF  11 LAST 303  05,2065  10 265 1            CCS     DECBRNCH
 0624  REF   4 LAST 304  05,2066  0 2324 0            TC      GODSPALM        ALARM IF DECIMAL USED FOR MCTBS
 0625  REF   1           05,2067  56 272 0            XCH     ZREG            OCTAL USED    OK
 0626  REF   1           05,2070  0 5161 1            TC      SETNCADR        ECADR INTO NOUNCADR, SET EB, NOUNADD.
 0627                    05,2071  0 0006 1            EXTEND
 0628  REF   2 LAST 304  05,2072  3 2076 1            DCA     LODNNLOC        SWITCH BANKS TO NOUN TABLE READING
 0629  REF   2 LAST 304  05,2073  52 006 0            DXCH    Z               ROUTINE.
 0630  REF   3 LAST 304  05,2074  0 2116 0            TC      VERBFAN

 0631  REF  19 LAST 303                  E0           EBANK=  DSPCOUNT
 0632                    05,2075   02000 0  LODNNLOC  2CADR   LODNNTAB
C0632  REF   1           05,2076   34000 0
 0633                    05,2077   77772 0  NEG5      OCT     77772

 0634  REF 438 LAST 296  05,2100  3 0142 0  INTMCTBS  CA      MPAC    +2      INTERNAL MACH CADR TO BE SPECIFIED.
 0635  REF   2 LAST 304  05,2101  0 5161 1            TC      SETNCADR        ECADR INTO NOUNCADR. SET EB, NOUNADD.
 0636  REF  23 LAST 281  05,2102  4 7654 0            CS      BIT4            NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
 0637  REF  10 LAST 303  05,2103  7 0266 1            MASK    VERBREG         CADR TO BE SPECIFIED.
 0638  REF   1           05,2104  6 2077 0            AD      NEG5            MASKING MAKES VB15 LOOK LIKE VB05.
 0639                    05,2105  0 0006 1            EXTEND
 0640  REF   4 LAST 304  05,2106  1 2116 1            BZF     VERBFAN         VB = 05 OR 15, DO NOT DISPLAY CADR.
 0641  REF   2 LAST 299  05,2107  3 5177 0            CAF     R3D1            VB NOT = 05 OR 15, DISPLAY CADR.
 0642  REF  20 LAST 304  05,2110  54 264 0            TS      DSPCOUNT
 0643  REF   2 LAST 304  05,2111  3 0304 0            CA      NOUNCADR
 0644  REF   1           05,2112  0 3222 0            TC      DSPOCTWD
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                     USER'S OWN PAGE NO.  17

 0645   REF    5 LAST 304     05,2113  0 2116 0                TC      VERBFAN

 0646   REF   64 LAST 301     05,2114  6 7657 1                AD      ONE
 0647   REF    3 LAST 304     05,2115  0 5161 1                TC      SETNCADR          ECADR INTO NOUNCADR. SETS EB, NOUNADD.
 0648   REF    1              05,2116  4 2131 1   VERBFAN      CS      LST2CON
 0649   REF   11 LAST 304     05,2117  6 0266 0                AD      VERBREG           VERB-LST2CON
 0650   REF  198 LAST 303     05,2120  10 000 0                CCS     A
 0651   REF   65 LAST 305     05,2121  6 7657 1                AD      ONE               VERB G/ LST2CON
 0652                         05,2122  0 2124 1                TC      +2
 0653   REF    1              05,2123  0 2133 1                TC      VBFANDIR          VERB L/ LST2CON
 0654   REF  439 LAST 304     05,2124  54 140 0                TS      MPAC
 0655   REF    1              05,2125  0 5341 1                TC      RELDSP            RELEASE DISPLAY SYST
 0656   REF  440 LAST 305     05,2126  56 140 1                XCH     MPAC              ALSO TURN OFF RELEASE DISPLAY SYST LIGHT
 0657   REF    1              05,2127  6 2132 0                AD      LST2CADR
 0658   REF    5 LAST 277     05,2130  0 4105 1                TC      BANKJUMP
 0659                         05,2131   00040 0   LST2CON      OCT     40                FIRST LST2 VERB
 0660   REF    1              05,2132   22000 1   LST2CADR     CADR    LST2FAN

 0661   REF   12 LAST 305     05,2133  50 266 0   VBFANDIR     INDEX   VERBREG
 0662   REF    1              05,2134  3 2136 1                CAF     VERBTAB
 0663   REF    6 LAST 305     05,2135  0 4105 1                TC      BANKJUMP

 0664   REF    5 LAST 304     05,2136   12324 1   VERBTAB      CADR    GODSPALM          VB00 ILLEGAL
 0665   REF    1              05,2137   12340 0                CADR    DSPA              VB01 DISPLAY OCT COMP 1 (R1)
 0666   REF    1              05,2140   12345 0                CADR    DSPB              VB02 DISPLAY OCT COMP 2 (R1)
 0667   REF    1              05,2141   12352 0                CADR    DSPC              VB03 DISPLAY OCT COMP 3 (R1)
 0668   REF    1              05,2142   12333 1                CADR    DSPAB             VB04 DISPLAY OCT COMP 1,2 (R1,R2)
 0669   REF    1              05,2143   12326 0                CADR    DSPABC            VB05 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
 0670   REF    1              05,2144   12445 1                CADR    DECDSP            VB06 DECIMAL DISPLAY
 0671   REF    1              05,2145   10704 0                CADR    DSPDPDEC          VB07 DP DECIMAL DISPLAY (R1,R2)
 0672   REF    1              05,2146   11277 0                CADR    DSPALARM          VB10 SPARE
 0673   REF    1              05,2147   13077 0                CADR    MONITOR           VB11 MONITOR OCT COMP 1 (R1)
 0674   REF    2 LAST 305     05,2150   13077 0                CADR    MONITOR           VB12 MONITOR OCT COMP 2 (R1)
 0675   REF    3 LAST 305     05,2151   13077 0                CADR    MONITOR           VB13 MONITOR OCT COMP 3 (R1)
 0676   REF    4 LAST 305     05,2152   13077 0                CADR    MONITOR           VB14 MONITOR OCT COMP 1,2 (R1,R2)
 0677   REF    5 LAST 305     05,2153   13077 0                CADR    MONITOR           VB15 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
 0678   REF    6 LAST 305     05,2154   13077 0                CADR    MONITOR           VB16 MONITOR DECIMAL
 0679   REF    7 LAST 305     05,2155   13077 0                CADR    MONITOR           VB17 MONITOR DP DEC  (R1,R2)
 0680   REF    6 LAST 305     05,2156   12324 1                CADR    GODSPALM          VB20 SPARE
 0681   REF    1              05,2157   12620 0                CADR    ALOAD             VB21 LOAD COMP 1 (R1)
 0682   REF    1              05,2160   12631 0                CADR    BLOAD             VB22 LOAD COMP 2 (R2)
 0683   REF    1              05,2161   12646 0                CADR    CLOAD             VB23 LOAD COMP 3 (R3)
 0684   REF    1              05,2162   12572 1                CADR    ABLOAD            VB24 LOAD COMP 1,2 (R1,R2)
 0685   REF    1              05,2163   12535 1                CADR    ABCLOAD           VB25 LOAD COMP 1,2,3 (R1,R2,R3)
 0686   REF    7 LAST 305     05,2164   12324 1                CADR    GODSPALM          VB26 SPARE
 0687   REF    1              05,2165   13214 1                CADR    DSPFMEM           VB27 FIXED MEMORY DISPLAY
A0688                                                                                    THE FOLLOWING VERBS MAKE NO NOUN TEST
 0689   REF    1              05,2166   13314 0   REQEXLOC     CADR    VBRQEXEC          VB30 REQUEST EXECUTIVE
 0690   REF    1              05,2167   13340 1                CADR    VBRQWAIT          VB31 REQUEST WAITLIST
 0691   REF    1              05,2170   11325 0                CADR    BUMP              VB32 C(R2) INTO R3, C(R1) INTO R2
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0692   REF   1          05,2171   11310 0            CADR   VBPROC       VB33 PROCEED WITHOUT DATA
0693   REF   1          05,2172   11315 0            CADR   VBTERM       VB34 TERMINATE CURRENT TEST OR LOAD REQ
0694   REF   1          05,2173   13414 1            CADR   VBTSTLTS     VB35 TEST LIGHTS
0695   REF   1          05,2174   24000 1            CADR   SLAP1        VB36 FRESH START
0696   REF   1          05,2175   13267 0  ENDVBFAN  CADR   MMCHANG      VB37 CHANGE MAJOR MODE

R0697  THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.
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P0698   NNADTAB CONTAINS A RELATIVE ADDRESS, IDADDREL(IN LOW 10 BITS), REFERRING
R0699   TO WHERE 3 CONSECUTIVE ADDRESSES ARE STORED (IN IDADDTAB).
R0700   MIXNOUN GETS DATA AND STORES IN MIXTEMP,+1,+2. IT SETS NOUNADD FOR
R0701    MIXTEMP.

 0702   REF    2 LAST 304      05,2176  10 132 0  MIXNOUN  CCS     NNADTEM
 0703                          05,2177  0 2203 1           TC      +4                +  IN USE
 0704   REF    8 LAST 305      05,2200  0 2324 0           TC      GODSPALM          +0  NOT IN USE
 0705                          05,2201  0 2203 1           TC      +2                -  IN USE
 0706                          05,2202  0 2203 1           TC      +1                -0  IN USE
 0707   REF    9 LAST 274      05,2203  4 6162 0           CS      SIX
 0708   REF   13 LAST 305      05,2204  6 0266 0           AD      VERBREG
 0709                          05,2205  0 0006 1           EXTEND
 0710                          05,2206  6 2210 0           BZMF    +2                VERB L/E 6
 0711   REF    6 LAST 305      05,2207  0 2116 0           TC      VERBFAN           AVOID MIXNOUN SWAP IF VB NOT = DISPLAY
 0712   REF   33 LAST 302      05,2210  3 7656 0           CAF     TWO
 0713   REF    1               05,2211  54 103 1  MIXNN1   TS      DECOUNT
 0714   REF    1               05,2212  6 2235 1           AD      MIXAD
 0715   REF    1               05,2213  54 131 0           TS      NOUNADD           SET NOUNADD TO MIXTEMP + K
 0716   REF    2 LAST 307      05,2214  50 103 0           INDEX   DECOUNT           GET IDADDTAB ENTRY FOR COMPONENT K
 0717   REF    1               05,2215  3 0134 1           CA      IDADITEM          OF NOUN.
 0718   REF    1               05,2216  54 106 1           TS      NOUNTEM
A0719                                                                                TEST FOR DP(FOR OCT DISPLAY). IF SO, GET
A0720                                                                                  MINOR PART ONLY.
 0721   REF    1               05,2217  0 2721 1           TC      SFRUTMIX          GET SF ROUT NUMBER IN A
 0722   REF    1               05,2220  0 2236 1           TC      DPTEST
 0723   REF    1               05,2221  0 2223 0           TC      MIXNN2            NO DP
 0724   REF    2 LAST 307      05,2222  24 106 0           INCR    NOUNTEM           DP  GET MINOR PART
 0725   REF    3 LAST 307      05,2223  3 0106 0  MIXNN2   CA      NOUNTEM
 0726   REF    4 LAST 163      05,2224  7 5234 0           MASK    LOW11             ESUBK (NO DP)  OR (ESUBK)+1    FOR DP
 0727   REF    1               05,2225  0 5171 0           TC      SETEBANK          SET EBANK, LEAVE EADRES IN A.
 0728   REF  199 LAST 305      05,2226  50 000 1           INDEX   A                 PICK UP C(ESUBK)  NOT DP
 0729                          05,2227  3 0000 1           CA      0                 OR C((ESUBK)+1)  FOR DP MINOR PART
 0730   REF    2 LAST 307      05,2230  50 131 1           INDEX   NOUNADD
 0731                          05,2231  56 000 1           XCH     0                 STORE IN MIXTEM + K
 0732   REF    3 LAST 307      05,2232  10 103 1           CCS     DECOUNT
 0733   REF    1               05,2233  0 2211 1           TC      MIXNN1
 0734   REF    7 LAST 307      05,2234  0 2116 0           TC      VERBFAN

 0735   REF    3 LAST 301      05,2235  0 0111 0  MIXAD    TC      MIXTEMP


R0736   DPTEST    ENTER WITH SF ROUT NUMBER IN A.
R0737             RETURNS TO L+1 IF NO DP.
R0738             RETURNS TO L+2 IF DP.

 0739   REF  200 LAST 307      05,2236  50 000 1  DPTEST   INDEX   A
 0740                          05,2237  1 2240 1           TCF     +1
 0741   REF  164 LAST 302      05,2240  0 0002 0           TC      Q                 OCTAL ONLY  NO DP
 0742   REF 165 LAST 307    05,2241  0 0002 0             TC       Q                 FRACT NO DP
 0743   REF 166 LAST 308    05,2242  0 0002 0             TC       Q                 DEG  NO DP
 0744   REF 167 LAST 308    05,2243  0 0002 0             TC       Q                 ARITH  NO DP
 0745   REF   1             05,2244  1 2250 0             TCF      DPTEST1           DP1OUT
 0746   REF   2 LAST 308    05,2245  1 2250 0             TCF      DPTEST1           DP2OUT
 0747   REF 168 LAST 308    05,2246  0 0002 0             TC       Q                 OPDEG  NO DP
 0748   REF   3 LAST 308    05,2247  1 2250 0             TCF      DPTEST1           DP3OUT
 0749   REF 169 LAST 308    05,2250  50 002 0  DPTEST1    INDEX    Q
 0750                       05,2251  0 0001 0             TC       1                 RETURN TO L+2


 0751   REF   3 LAST 302    05,2252  3 5175 1  REQDATX    CAF      R1D1
 0752   REF   1             05,2253  1 2257 1             TCF      REQCOM
 0753   REF   2 LAST 299    05,2254  3 5176 1  REQDATY    CAF      R2D1
 0754   REF   2 LAST 308    05,2255  1 2257 1             TCF      REQCOM
 0755   REF   3 LAST 304    05,2256  3 5177 0  REQDATZ    CAF      R3D1
 0756   REF  21 LAST 304    05,2257  54 264 0  REQCOM     TS       DSPCOUNT
 0757   REF 170 LAST 308    05,2260  4 0002 1             CS       Q
 0758   REF   8 LAST 303    05,2261  54 300 0             TS       REQRET
 0759   REF  19 LAST 301    05,2262  0 4063 0             TC       BANKCALL
 0760   REF   2 LAST 301    05,2263    10476 0            CADR     5BLANK
 0761   REF   4 LAST 277    05,2264  0 5274 0             TC       FLASHON
 0762   REF   4 LAST 304    05,2265  4 5150 1             CS       ENDINST
 0763   REF   2 LAST 304    05,2266  6 0122 0             AD       ENTEXIT
 0764                       05,2267  0 0006 1             EXTEND
 0765   REF   1             05,2270  1 2273 1             BZF      ENDRQDAT          ENTEXIT = ENDOFJOB. EXTERNALLY INITIATED
 0766   REF 109 LAST 303    05,2271  4 7665 1             CS       ZERO              ENTEXIT NOT ENDOFJOB. NVSUB INITIATED
 0767   REF   4 LAST 225    05,2272  54 323 1             TS       CADRSTOR          NVSUB INITIATED LOAD. SET CADRSTOR TO -0
 0768   REF   3 LAST 308    05,2273  0 0122 0  ENDRQDAT   TC       ENTEXIT

R0769   IF NVSUB INITIATED LOAD, SET CADRSTOR TO -0 TO TELL RECALTST TO RELEASE
R0770   DISPLAY IF ENDIDLE WAS NOT USED. (NECESSARY FOR DATAWAIT)


 0771   REF   4 LAST 298    05,2274  54 267 0             TS       NOUNREG
 0772   REF 171 LAST 308    05,2275  56 002 0  UPDATNN    XCH      Q
 0773   REF   1             05,2276  54 103 1             TS       UPDATRET
 0774                       05,2277  0 0006 1             EXTEND
 0775   REF   3 LAST 304    05,2300  3 2076 1             DCA      LODNNLOC          SWITCH BANKS TO NOUN TABLE READING
 0776   REF   3 LAST 304    05,2301  52 006 0             DXCH     Z                 ROUTINE.
 0777   REF   3 LAST 307    05,2302  10 132 0             CCS      NNADTEM
 0778   REF  66 LAST 305    05,2303  6 7657 1             AD       ONE               NORMAL
 0779   REF   1             05,2304  1 2307 0             TCF      PUTADD
 0780   REF   2 LAST 308    05,2305  1 2310 0             TCF      PUTADD   +1       MCTBS  DONT CHANGE NOUNADD
 0781   REF   3 LAST 308    05,2306  1 2310 0             TCF      PUTADD   +1       MCTBI  DONT CHANGE NOUNADD
 0782   REF   4 LAST 305    05,2307  0 5161 1  PUTADD     TC       SETNCADR          ECADR INTO NOUNCADR, SETS EB, NOUNADD.
 0783   REF   2 LAST 298    05,2310  3 5240 1             CAF      ND1
 0784   REF  22 LAST 308    05,2311  54 264 0             TS       DSPCOUNT
 0785   REF    5 LAST 308     05,2312  3 0267 1             CA      NOUNREG
 0786   REF    1              05,2313  1 2322 1             TCF     UPDAT1

 0787   REF   14 LAST 307     05,2314  54 266 1             TS      VERBREG
 0788   REF  172 LAST 308     05,2315  56 002 0  UPDATVB    XCH     Q
 0789   REF    2 LAST 308     05,2316  54 103 1             TS      UPDATRET
 0790   REF    3 LAST 297     05,2317  3 5237 1             CAF     VD1
 0791   REF   23 LAST 308     05,2320  54 264 0             TS      DSPCOUNT
 0792   REF   15 LAST 309     05,2321  3 0266 0             CA      VERBREG
 0793   REF    1              05,2322  0 3255 0  UPDAT1     TC      DSP2BIT
 0794   REF    3 LAST 309     05,2323  0 0103 0             TC      UPDATRET


 0795   REF   11 LAST 295     05,2324  0 4102 0  GODSPALM   TC      POSTJUMP
 0796   REF    2 LAST 305     05,2325    11277 0            CADR    DSPALARM
```

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P0797            NOUN    TABLES
R0798   NOUN CODE L/ 55, NORMAL CASE.  NOUN CODE G/E 55, MIXED NOUN CASE.
R0799   FOR NORMAL CASE, NNADTAB CONTAINS ONE        ECADR      FOR EACH NOUN.
R0800   +0 INDICATES NOUN NOT USED.   - ENTRY INDICATES MACHINE CADR(E OR F) TO
R0801   BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
R0802   OF LAST MACHINE CADR SUPPLIED.

R0803   FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
R0804   10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

R0805   NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

R0806   FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
R0807                        N-S ARE THE SF ROUTINE CODE NUMBER.
R0808                        P-S ARE THE SF CONSTANT CODE NUMBER.

R0809   MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER      3 COMPONENT CASE
R0810              N-S ARE THE SF CONSTANT2 CODE NUMBER
R0811              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0812              N-S ARE THE SF CONSTANT2 CODE NUMBER      2 COMPONENT CASE
R0813              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0814              P-S ARE THE SF CONSTANT1 CODE NUMBER       1 COMPONENT CASE

R0815   THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
R0816   EACH ENTRY CONTAINS ONE ECADR.    IDADDREL IS THE RELATIVE ADDRESS OF
R0817   THE FIRST OF THESE ENTRIES.
R0818   THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
R0819   THEY ARE LISTED IN ORDER OF ASCENDING K.

R0820   THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
R0821   CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
R0822           QQQQQRRRRRSSSSS
R0823   Q-S ARE THE SF ROUTINE 3 CODE NUMBER      3 COMPONENT CASE
R0824   R-S ARE THE SF ROUTINE 2 CODE NUMBER
R0825   S-S ARE THE SF ROUTINE 1 CODE NUMBER
R0826   R-S ARE THE SF ROUTINE 2 CODE NUMBER      2 COMPONENT CASE
R0827   S-S ARE THE SF ROUTINE 1 CODE NUMBER



R0828   IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
R0829   COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
R0830   ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 1 COMPONENT.
R0831   ONLY EXCEPTION IS NOUN 01 TO ALLOW OCTAL DISPLAYS AND LOADS OF
R0832   AN UNCONTOLLED NUMBER OF COMPONENTS.


R0833   IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
R0834   COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.
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R0835   IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
R0836   BEFORE EACH ENTER. IF NOT, ALARM.
```

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P0837               DISPLAY  VERBS
 0838   REF  34 LAST 307     05,2326  4 7656 1  DSPABC   CS       TWO
 0839   REF   1              05,2327  0 2376 1           TC       COMPTEST
 0840   REF   3 LAST 307     05,2330  50 131 1           INDEX    NOUNADD
 0841                        05,2331  4 0002 1           CS       2
 0842   REF 115 LAST 262     05,2332  56 116 1           XCH      BUF      +2
 0843   REF  67 LAST 308     05,2333  4 7657 0  DSPAB    CS       ONE
 0844   REF   2 LAST 312     05,2334  0 2376 1           TC       COMPTEST
 0845   REF   4 LAST 312     05,2335  50 131 1           INDEX    NOUNADD
 0846                        05,2336  4 0001 1           CS       1
 0847   REF 116 LAST 312     05,2337  56 115 1           XCH      BUF      +1
 0848   REF   1              05,2340  0 2420 0  DSPA     TC       TSTFORDP
 0849   REF   5 LAST 312     05,2341  50 131 1           INDEX    NOUNADD
 0850                        05,2342  4 0000 0           CS       0
 0851   REF 117 LAST 312     05,2343  56 114 0  DSPCOM1  XCH      BUF
 0852   REF   1              05,2344  0 2357 1           TC       DSPCOM2
 0853   REF  68 LAST 312     05,2345  4 7657 0  DSPB     CS       ONE
 0854   REF   3 LAST 312     05,2346  0 2376 1           TC       COMPTEST
 0855   REF   6 LAST 312     05,2347  50 131 1           INDEX    NOUNADD
 0856                        05,2350  4 0001 1           CS       1
 0857   REF   1              05,2351  0 2343 1           TC       DSPCOM1
 0858   REF  35 LAST 312     05,2352  4 7656 1  DSPC     CS       TWO
 0859   REF   4 LAST 312     05,2353  0 2376 1           TC       COMPTEST
 0860   REF   7 LAST 312     05,2354  50 131 1           INDEX    NOUNADD
 0861                        05,2355  4 0002 1           CS       2
 0862   REF   2 LAST 312     05,2356  0 2343 1           TC       DSPCOM1
 0863   REF  36 LAST 312     05,2357  4 7656 1  DSPCOM2  CS       TWO                  A  B  C  AB  ABC
 0864   REF  16 LAST 309     05,2360  6 0266 0           AD       VERBREG              -1 -0 +1 +2  +3    IN A
 0865   REF 201 LAST 307     05,2361  10 000 0           CCS      A                    +0 +0 +0 +1  +2     IN A AFTER CCS
 0866   REF   1              05,2362  0 2365 0           TC       DSPCOM3
 0867   REF   4 LAST 308     05,2363  0 0122 0           TC       ENTEXIT
 0868                        05,2364  0 2365 0           TC       +1
 0869   REF   1              05,2365  54 106 1  DSPCOM3  TS       DISTEM               +0,+1,+2 INTO DISTEM
 0870   REF 202 LAST 312     05,2366  50 000 1           INDEX    A
 0871   REF   4 LAST 308     05,2367  3 5175 1           CAF      R1D1
 0872   REF  24 LAST 309     05,2370  54 264 0           TS       DSPCOUNT
 0873   REF   2 LAST 312     05,2371  50 106 0           INDEX    DISTEM
 0874   REF 118 LAST 312     05,2372  4 0114 1           CS       BUF
 0875   REF   2 LAST 304     05,2373  0 3222 0           TC       DSPOCTWD
 0876   REF   3 LAST 312     05,2374  56 106 0           XCH      DISTEM
 0877   REF   2 LAST 312     05,2375  0 2361 1           TC       DSPCOM2 +2

R0878   COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
R0879   GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
R0880   NOUN 01 IS EXCLUDED FROM TEST.
 0881   REF   1              05,2376  54 107 0  COMPTEST TS       SFTEMP1              - VERB COMP
 0882   REF 173 LAST 309     05,2377  22 002 0           LXCH     Q
 0883   REF  69 LAST 312     05,2400  4 7657 0  COMPTST1 CS       ONE
 0884   REF   6 LAST 309     05,2401  6 0267 1           AD       NOUNREG
 0885                        05,2402  0 0006 1           EXTEND
```

```
0886  REF    1               05,2403  1 2417 0             BZF     NDCMPTST        NOUN = 01, ANY COMP OK
0887  REF    2 LAST 304      05,2404  50 124 0             INDEX   MIXBR           NOUN NOT = 01.
0888  REF    1               05,2405  3 2442 1             CAF     COMPICK -1
0889  REF  203 LAST 312      05,2406  50 000 1             INDEX   A
0890                         05,2407  3 0000 1             CA      0
0891  REF    2 LAST 163      05,2410  7 5226 0             MASK    HI5
0892  REF    1               05,2411  0 5207 1             TC      LEFT5           NOUN COMP
0893  REF    2 LAST 312      05,2412  6 0107 1             AD      SFTEMP1         NOUN COMP - VERB COMP
0894  REF  204 LAST 313      05,2413  10 000 0             CCS     A
0895  REF   71 LAST 302      05,2414  0 0001 0             TC      L               NOUN COMP G/ VERB COMP
0896  REF   15 LAST 301      05,2415  0 5464 1             TC      CCSHOLE
0897  REF    9 LAST 307      05,2416  0 2324 0             TC      GODSPALM        NOUN COMP L/ VERB COMP
0898  REF   72 LAST 313      05,2417  0 0001 0  NDCMPTST   TC      L               NOUN COMP = VERB COMP


0899  REF  174 LAST 312      05,2420  22 002 0  TSTFORDP   LXCH    Q               TEST FOR DP. IF SO, GET MINOR PART ONLY.
0900  REF    4 LAST 308      05,2421  3 0132 1             CA      NNADTEM
0901  REF   70 LAST 312      05,2422  6 7657 1             AD      ONE             IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
0902                         05,2423  0 0006 1             EXTEND
0903  REF    1               05,2424  1 2436 0             BZF     CHANDSP
0904  REF    3 LAST 313      05,2425  50 124 0             INDEX   MIXBR
0905                         05,2426  0 2426 0             TC      +0
0906                         05,2427  0 2431 0             TC      +2              NORMAL
0907  REF   73 LAST 313      05,2430  0 0001 0             TC      L               MIXED CASE ALREADY HANDLED IN MIXNOUN
0908  REF    1               05,2431  0 2713 0             TC      SFRUTNOR
0909  REF    2 LAST 307      05,2432  0 2236 1             TC      DPTEST
0910  REF   74 LAST 313      05,2433  0 0001 0             TC      L               NO DP
0911  REF    8 LAST 312      05,2434  24 131 1             INCR    NOUNADD         DP    E+1 INTO NOUNADD FOR MINOR PART.
0912  REF   75 LAST 313      05,2435  0 0001 0             TC      L


0913                         05,2436  0 0006 1  CHANDSP    EXTEND
0914  REF    3 LAST 304      05,2437  5 0304 0             INDEX   NOUNCADR
0915                         05,2440  00 000 1             READ    0
0916  REF  205 LAST 313      05,2441  4 0000 0             CS      A
0917  REF    3 LAST 312      05,2442  1 2343 0             TCF     DSPCOM1


0918  REF    1               05,2443    00133 0  COMPICK   ADRES   NNTYPTEM
0919  REF    5 LAST 313      05,2444    00132 1            ADRES   NNADTEM

0920  REF    4 LAST 313      05,2445  50 124 0  DECDSP     INDEX   MIXBR           NORMAL                MIXED
0921  REF    2 LAST 313      05,2446  3 2442 1             CAF     COMPICK -1      ADRES NNTYPTEM        ADRES NNADTEM
0922  REF  206 LAST 313      05,2447  50 000 1             INDEX   A
0923                         05,2450  3 0000 1             CA      0               C(NNTYPTEM)           C(NNADTEM)
0924  REF    3 LAST 313      05,2451  7 5226 0             MASK    HI5             GET HI5 OF NNTYPTAB(NORM)OF NNADTAB(MIX)
0925  REF    2 LAST 313      05,2452  0 5207 1             TC      LEFT5
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 0926   REF   4 LAST 307   05,2453  54 103 1            TS       DECOUNT         COMP NUMBER INTO DECOUNT
 0927   REF   1            05,2454  54 106 1  DSPDCGET  TS       DECTEM          PICKS UP DATA
 0928   REF   9 LAST 313   05,2455  6 0131 1            AD       NOUNADD         DECTEM  1COMP +0, 2COMP +1, 3COMP +2
 0929   REF 207 LAST 313   05,2456  50 000 1            INDEX    A
 0930                      05,2457  4 0000 0            CS       0
 0931   REF   2 LAST 314   05,2460  50 106 0            INDEX    DECTEM
 0932   REF   1            05,2461  56 270 1            XCH      XREG            CANT USE BUF SINCE DMP USES IT.
 0933   REF   3 LAST 314   05,2462  10 106 1            CCS      DECTEM
 0934   REF   1            05,2463  0 2454 0            TC       DSPDCGET        MORE TO GET
 0935   REF 110 LAST 308   05,2464  3 7665 0  DSPDCPUT  CAF      ZERO            DISPLAYS DATA
 0936   REF 441 LAST 305   05,2465  54 141 1            TS       MPAC      +1    DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
 0937   REF 442 LAST 314   05,2466  54 142 1            TS       MPAC      +2
 0938   REF   5 LAST 314   05,2467  50 103 0            INDEX    DECOUNT
 0939   REF   5 LAST 312   05,2470  3 5175 1            CAF      R1D1
 0940   REF  25 LAST 312   05,2471  54 264 0            TS       DSPCOUNT
 0941   REF   6 LAST 314   05,2472  50 103 0            INDEX    DECOUNT
 0942   REF   2 LAST 314   05,2473  4 0270 0            CS       XREG
 0943   REF 443 LAST 314   05,2474  54 140 0            TS       MPAC
 0944   REF   1            05,2475  0 2734 0            TC       SFCONUM         2X( SF CON NUMB ) IN A
 0945   REF   3 LAST 313   05,2476  54 107 0            TS       SFTEMP1
 0946                      05,2477  0 0006 1            EXTEND                   SWITCH BANKS TO SF CONSTANT TABLE
 0947   REF   1            05,2500  3 2512 0            DCA      GTSFOUTL           READING ROUTINE.
 0948   REF   4 LAST 308   05,2501  52 006 0            DXCH     Z               LOADS SFTEMP1, SFTEMP2.
 0949   REF   5 LAST 313   05,2502  50 124 0            INDEX    MIXBR
 0950                      05,2503  0 2503 0            TC       +0
 0951   REF   1            05,2504  0 2507 1            TC       DSPSFNOR
 0952   REF   2 LAST 307   05,2505  0 2721 1            TC       SFRUTMIX
 0953   REF   1            05,2506  0 2522 0            TC       DECDSP3

 0954   REF   2 LAST 313   05,2507  0 2713 0  DSPSFNOR  TC       SFRUTNOR
 0955   REF   2 LAST 314   05,2510  0 2522 0            TC       DECDSP3

 0956   REF  26 LAST 314                  E0            EBANK=   DSPCOUNT
 0957                      05,2511   02037 1  GTSFOUTL  2CADR    GTSFOUT
C0957   REF   1            05,2512   34000 0


 0958   REF  20 LAST 308   05,2513  0 4063 0  DSPDCEND  TC       BANKCALL        ALL SFOUT ROUTINES END HERE
 0959   REF   1            05,2514   11101 1            CADR     DSPDECWD
 0960   REF   7 LAST 314   05,2515  10 103 1            CCS      DECOUNT
 0961                      05,2516  0 2520 1            TC       +2
 0962   REF   5 LAST 312   05,2517  0 0122 0            TC       ENTEXIT
 0963   REF   8 LAST 314   05,2520  54 103 1            TS       DECOUNT
 0964   REF   1            05,2521  0 2464 0            TC       DSPDCPUT        MORE TO DISPLAY


 0965   REF 208 LAST 314   05,2522  50 000 1  DECDSP3   INDEX    A
 0966   REF   1            05,2523  3 2525 1            CAF      SFOUTABR
 0967   REF   7 LAST 305   05,2524  0 4105 1            TC       BANKJUMP
 0968   REF   3 LAST 309      05,2525   11277 0  SFOUTABR CADR    DSPALARM        ALARM IF DEC DISP WITH OCTAL ONLY NOUN
 0969   REF   1               05,2526   12513 0           CADR    DSPDCEND
 0970   REF   1               05,2527   10555 0           CADR    DEGOUTSF
 0971   REF   1               05,2530   10642 0           CADR    ARTOUTSF
 0972   REF   1               05,2531   10647 0           CADR    DP1OUTSF
 0973   REF   1               05,2532   10654 1           CADR    DP2OUTSF
 0974   REF   1               05,2533   10563 0           CADR    OPDEGOUT
 0975   REF   1               05,2534   10656 0           CADR    DP3OUTSF
 0976                                   05,2535  ENDRTOUT EQUALS


R0977          THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
R0978   LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEND


 0979   REF   2 LAST 302                04,2555                    SETLOC BLANKCON +1

R0980      DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE , ADDING .18 FOR
R0981   NUMBERS IN THE NEGATIVE (AGC) RANGE.

 0982   REF 111 LAST 314      04,2555  3 7665 0  DEGOUTSF CAF     ZERO
 0983   REF 444 LAST 314      04,2556  54 142 1           TS      MPAC     +2     SET INDEX FOR FULL SCALE
 0984   REF   1               04,2557  0 2614 0           TC      FIXRANGE
 0985                         04,2560  0 2562 1           TC      +2              NO AUGMENT NEEDED (SFTEMP1 AND 2 ARE 0)
 0986   REF   1               04,2561  0 2607 1           TC      SETAUG          SET AUGMENTER ACCORDING TO C(MPAC +2)
 0987   REF   1               04,2562  0 2625 1           TC      DEGCOM

R0988   OPDEGOUT SCALES BY .45 (THE RANGE IS 90 DEGREES) AND ADDS A 20 DEG BIAS.

 0989   REF 445 LAST 315      04,2563  10 140 0  OPDEGOUT CCS     MPAC            RANGE IS 90 DEG
 0990   REF 446 LAST 315      04,2564  56 140 1           XCH     MPAC            IF POS OR POS 0 THEN ADD BIAS AND
 0991                         04,2565  0 2570 1           TC      +3              CORRECT FOR POSSIBLE OVERFLOW
 0992   REF   1               04,2566  0 2577 0           TC      NEGOPT          IF NEG NON ZERO
 0993   REF   5 LAST 215      04,2567  6 7667 1           AD      NEG1            IF NEG ZERO SUBTRACT 1
 0994   REF   1               04,2570  6 2641 0           AD      20BIAS
 0995   REF 447 LAST 315      04,2571  54 140 0  BIASCOM  TS      MPAC            TEST FOR OVERFLOW
 0996                         04,2572  0 2575 1           TC      +3              NO OVFLOW
 0997   REF  21 LAST 304      04,2573  3 7641 0           CAF     BIT15           IF OVFLOW
 0998   REF 448 LAST 315      04,2574  26 140 0           ADS     MPAC
 0999   REF  37 LAST 312      04,2575  3 7656 0           CAF     TWO             SET MULTIPLIER TO .45
 1000   REF   2 LAST 315      04,2576  0 2556 0           TC      DEGOUTSF +1

 1001   REF 449 LAST 315      04,2577  56 140 1  NEGOPT   XCH     MPAC            NEGATIVE CASE
 1002   REF   2 LAST 315      04,2600  6 2641 0           AD      20BIAS
 1003   REF 209 LAST 314      04,2601  10 000 0           CCS     A
 1004   REF   1               04,2602  0 2571 0           TC      BIASCOM         IF POS THEN SUBTRACT 1 BECAUSE OF 2SCOM
 1005   REF  16 LAST 313      04,2603  0 5464 1           TC      CCSHOLE
 1006   REF  71 LAST 313      04,2604  6 7657 1           AD      ONE             IF NEG RESTORE SUM
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                        04,2605  4 0000 0            COM                     IF NEG 0 LEAVE NEG 0
REF   2 LAST 315        04,2606  0 2571 0            TC      BIASCOM

                        04,2607  0 0006 1  SETAUG    EXTEND                  LOADS SFTEMP1 AND SFTEMP2 WITH THE
REF 450 LAST 315        04,2610  5 0142 0            INDEX   MPAC     +2     DP AUGMENTER CONSTANT
REF   1                 04,2611  3 2636 0            DCA     DEGTAB
REF   4 LAST 314        04,2612  52 110 0            DXCH    SFTEMP1
REF 175 LAST 313        04,2613  0 0002 0            TC      Q

REF 451 LAST 316        04,2614  10 140 0  FIXRANGE  CCS     MPAC            IF MPAC IS + RETURN TO L+1
REF 176 LAST 316        04,2615  0 0002 0            TC      Q               IF MPAC IS - RETURN TO L+2 AFTER
REF 177 LAST 316        04,2616  0 0002 0            TC      Q               MASKING OUT THE SIGN BIT
                        04,2617  1 2620 0            TCF     +1
REF  22 LAST 315        04,2620  4 7641 1            CS      BIT15
REF 452 LAST 316        04,2621  7 0140 0            MASK    MPAC
REF 453 LAST 316        04,2622  54 140 0            TS      MPAC
REF 178 LAST 316        04,2623  50 002 0            INDEX   Q
                        04,2624  0 0001 0            TC      1

                        04,2625  0 0006 1  DEGCOM    EXTEND                  LOADS MULTIPLIER , DOES SHORTMP, AND
REF 454 LAST 316        04,2626  5 0142 0            INDEX   MPAC     +2     ADDS AUGMENTER.
REF   2 LAST 316        04,2627  3 2636 0            DCA     DEGTAB
REF 455 LAST 316        04,2630  52 141 1            DXCH    MPAC            ADJUSTED ANGLE IN A
REF   2 LAST 296        04,2631  0 7266 1            TC      SHORTMP
REF   5 LAST 316        04,2632  52 110 0            DXCH    SFTEMP1
REF 456 LAST 316        04,2633  20 141 1            DAS     MPAC
REF   1                 04,2634  0 2645 1            TC      SCOUTEND



                        04,2635   05605 1  DEGTAB    OCT     05605           HI PART OF     .18
                        04,2636   03656 1            OCT     03656           LOW PART OF    .18
                        04,2637   16314 0            OCT     16314           HI PART OF     .45
                        04,2640   31463 1            OCT     31463           LO PART OF     .45

                        04,2641   16040 1  20BIAS    OCT     16040           20 DEG BIAS FOR OPTICS

REF   6 LAST 316        04,2642  52 110 0  ARTOUTSF  DXCH    SFTEMP1         ASSUMES POINT AT LEFT OF DP SFCON
REF 457 LAST 316        04,2643  52 141 1            DXCH    MPAC
REF   3 LAST 316        04,2644  0 7266 1            TC      SHORTMP
REF  12 LAST 309        04,2645  0 4102 0  SCOUTEND  TC      POSTJUMP
REF   2 LAST 315        04,2646   12513 0            CADR    DSPDCEND

REF   1                 04,2647  0 2661 1  DP1OUTSF  TC      DPOUT           SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
REF 458 LAST 316        04,2650  56 142 0            XCH     MPAC     +2     IN SFTEMP1, SFTEMP2.  THEN SCALE RESULT
REF 459 LAST 316        04,2651  56 141 0            XCH     MPAC     +1     BY B14.
REF 460 LAST 316        04,2652  54 140 0            TS      MPAC
REF   2 LAST 316        04,2653  0 2645 1            TC      SCOUTEND
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 1046  REF   2 LAST 316   04,2654  0 2661 1  DP2OUTSF TC     DPOUT       SCALES MPAC , MPAC +1 BY DP SCALE FACTOR
 1047  REF   3 LAST 316   04,2655  0 2645 1           TC     SCOUTEND


 1048  REF   3 LAST 317   04,2656  0 2661 1  DP3OUTSF TC     DPOUT       ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1049  REF   1            04,2657  0 3054 0           TC     TPLEFT7     PART OF SFCON. SHIFTS RESULTS LEFT 7.
 1050  REF   4 LAST 317   04,2660  0 2645 1           TC     SCOUTEND


R1051  DPOUT PICKS UP FRESH DATA FOR BOTH HI AND LO COMPONENTS.
R1052  THIS IS NEEDED FOR TIME DISPLAY.

 1053  REF 179 LAST 316   04,2661  56 002 0  DPOUT    XCH    Q
 1054  REF  14 LAST 130   04,2662  54 105 1           TS     OVFIND
 1055  REF   6 LAST 314   04,2663  50 124 0           INDEX  MIXBR
 1056                     04,2664  0 2664 1           TC     +0
 1057  REF   1            04,2665  0 2702 0           TC     DPOUTNOR
 1058  REF   9 LAST 314   04,2666  50 103 0           INDEX  DECOUNT     GET IDADDTAB ENTRY FOR COMPONENT K
 1059  REF   2 LAST 307   04,2667  3 0134 1           CA     IDADITEM        OF NOUN.
 1060  REF   5 LAST 307   04,2670  7 5234 0           MASK   LOW11       E SUBK
 1061  REF   2 LAST 307   04,2671  0 5171 0           TC     SETEBANK    SET EB, LEAVE EADRES IN A.
 1062                     04,2672  0 0006 1  DPOUTCOM EXTEND
 1063  REF 210 LAST 315   04,2673  5 0000 1           INDEX  A           MIXED            NORMAL
 1064                     04,2674  3 0001 0           DCA    0           C(ESUBK)         C(E)
 1065  REF 461 LAST 316   04,2675  52 141 1           DXCH   MPAC        C((E SUBK)+1)          C(E+1)
 1066  REF   3 LAST 266   04,2676  0 7235 1           TC     TPAGREE
 1067  REF   2 LAST 296   04,2677  0 7063 0           TC     DMP
 1068  REF   7 LAST 316   04,2700   00107 1           ADRES  SFTEMP1
 1069  REF  15 LAST 317   04,2701  0 0105 0           TC     OVFIND

 1070  REF  10 LAST 314   04,2702  3 0131 1  DPOUTNOR CA     NOUNADD     E
 1071  REF   1            04,2703  0 2672 0           TC     DPOUTCOM


R1072  THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1073  WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
R1074  ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1075  OF THE REGISTER NOUNADD IS POINTING TO .  IF USED WITH NOUNS WHICH ARE
R1076  INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1077  DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.


 1078  REF   7 LAST 317   04,2704  50 124 0  DSPDPDEC INDEX  MIXBR
 1079                     04,2705  0 2705 1           TC     +0
 1080                     04,2706  0 2710 0           TC     +2          NORMAL NOUN
 1081  REF   4 LAST 315   04,2707  0 3277 0           TC     DSPALARM
 1082                         04,2710  0 0006 1             EXTEND
 1083    REF  11 LAST 317     04,2711  5 0131 1             INDEX    NOUNADD
 1084                         04,2712  3 0001 0             DCA      0
 1085    REF 462 LAST 317     04,2713  52 141 1             DXCH     MPAC
 1086    REF   6 LAST 314     04,2714  3 5175 1             CAF      R1D1
 1087    REF  27 LAST 314     04,2715  54 264 0             TS       DSPCOUNT
 1088    REF 112 LAST 315     04,2716  3 7665 0             CAF      ZERO
 1089    REF 463 LAST 318     04,2717  54 142 1             TS       MPAC   +2
 1090    REF   4 LAST 317     04,2720  0 7235 1             TC       TPAGREE
 1091    REF   1              04,2721  0 3155 0             TC       DSP2DEC
 1092    REF   6 LAST 314     04,2722  0 0122 0   ENDDPDEC  TC       ENTEXIT
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P1093           LOAD   VERBS


 1094   REF   1                     05,2535              SETLOC ENDRTOUT

 1095   REF  38 LAST 315   05,2535  4 7656 1  ABCLOAD   CS     TWO
 1096   REF   5 LAST 312   05,2536  0 2376 1            TC     COMPTEST
 1097   REF   1            05,2537  3 2673 1            CAF    VBSP1LD
 1098   REF   2 LAST 301   05,2540  0 2314 0            TC     UPDATVB   -1
 1099   REF   1            05,2541  0 2252 0            TC     REQDATX
 1100   REF   1            05,2542  3 2674 0            CAF    VBSP2LD
 1101   REF   3 LAST 319   05,2543  0 2314 0            TC     UPDATVB   -1
 1102   REF   1            05,2544  0 2254 0            TC     REQDATY
 1103   REF   1            05,2545  3 2675 1            CAF    VBSP3LD
 1104   REF   4 LAST 319   05,2546  0 2314 0            TC     UPDATVB -1
 1105   REF   2 LAST 304   05,2547  0 2256 1            TC     REQDATZ


 1106   REF  10 LAST 307   05,2550  4 6162 0  PUTXYZ    CS     SIX                 TEST THAT THE 3 DATA WORDS LOADED ARE
 1107   REF   1            05,2551  0 2676 1            TC     ALLDC/OC            ALL DEC OR ALL OCT.
 1108                      05,2552  0 0006 1            EXTEND
 1109   REF   4 LAST 308   05,2553  3 2076 1            DCA    LODNNLOC            SWITCH BANKS TO NOUN TABLE READING
 1110   REF   5 LAST 314   05,2554  52 006 0            DXCH   Z                   ROUTINE.
 1111   REF 113 LAST 318   05,2555  3 7665 0            CAF    ZERO                X COMP
 1112   REF   1            05,2556  0 2762 0            TC     PUTCOM
 1113   REF  12 LAST 318   05,2557  50 131 1            INDEX  NOUNADD
 1114                      05,2560  54 000 0            TS     0
 1115   REF  72 LAST 315   05,2561  3 7657 1            CAF    ONE                 Y COMP
 1116   REF   2 LAST 319   05,2562  0 2762 0            TC     PUTCOM
 1117   REF  13 LAST 319   05,2563  50 131 1            INDEX   NOUNADD
 1118                      05,2564  54 001 1            TS     1
 1119   REF  39 LAST 319   05,2565  3 7656 0            CAF    TWO                 Z COMP
 1120   REF   3 LAST 319   05,2566  0 2762 0            TC     PUTCOM
 1121   REF  14 LAST 319   05,2567  50 131 1            INDEX  NOUNADD
 1122                      05,2570  54 002 1            TS     2
 1123   REF   2 LAST 303   05,2571  0 2663 0            TC     LOADLV

 1124   REF  73 LAST 319   05,2572  4 7657 0  ABLOAD    CS     ONE
 1125   REF   6 LAST 319   05,2573  0 2376 1            TC     COMPTEST
 1126   REF   2 LAST 319   05,2574  3 2673 1            CAF    VBSP1LD
 1127   REF   5 LAST 319   05,2575  0 2314 0            TC     UPDATVB -1
 1128   REF   2 LAST 319   05,2576  0 2252 0            TC     REQDATX
 1129   REF   2 LAST 319   05,2577  3 2674 0            CAF    VBSP2LD
 1130   REF   6 LAST 319   05,2600  0 2314 0            TC     UPDATVB -1
 1131   REF   2 LAST 319   05,2601  0 2254 0            TC     REQDATY
 1132   REF   4 LAST 271   05,2602  4 7664 0  PUTXY     CS     FIVE                TEST THAT THE 2 DATA WORDS LOADED ARE
 1133   REF   2 LAST 319   05,2603  0 2676 1            TC     ALLDC/OC            ALL DEC OR ALL OCT.
 1134                      05,2604  0 0006 1            EXTEND
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1135   REF   5 LAST 319    05,2605  3 2076 1           DCA     LODNNLOC     SWITCH BANKS TO NOUN TABLE READING
1136   REF   6 LAST 319    05,2606  52 006 0           DXCH    Z            ROUTINE.
1137   REF 114 LAST 319    05,2607  3 7665 0           CAF     ZERO         X COMP
1138   REF   4 LAST 319    05,2610  0 2762 0           TC      PUTCOM
1139   REF  15 LAST 319    05,2611  50 131 1           INDEX   NOUNADD
1140                       05,2612  54 000 0           TS      0
1141   REF  74 LAST 319    05,2613  3 7657 1           CAF     ONE          Y COMP
1142   REF   5 LAST 320    05,2614  0 2762 0           TC      PUTCOM
1143   REF  16 LAST 320    05,2615  50 131 1           INDEX   NOUNADD
1144                       05,2616  54 001 1           TS      1
1145   REF   3 LAST 319    05,2617  0 2663 0           TC      LOADLV

1146   REF   3 LAST 319    05,2620  0 2252 0  ALOAD    TC      REQDATX
1147                       05,2621  0 0006 1           EXTEND
1148   REF   6 LAST 320    05,2622  3 2076 1           DCA     LODNNLOC     SWITCH BANKS TO NOUN TABLE READING
1149   REF   7 LAST 320    05,2623  52 006 0           DXCH    Z            ROUTINE.
1150   REF 115 LAST 320    05,2624  3 7665 0           CAF     ZERO         X COMP
1151   REF   6 LAST 320    05,2625  0 2762 0           TC      PUTCOM
1152   REF  17 LAST 320    05,2626  50 131 1           INDEX   NOUNADD
1153                       05,2627  54 000 0           TS      0
1154   REF   4 LAST 320    05,2630  0 2663 0           TC      LOADLV

1155   REF  75 LAST 320    05,2631  4 7657 0  BLOAD    CS      ONE
1156   REF   7 LAST 319    05,2632  0 2376 1           TC      COMPTEST
1157   REF  23 LAST 316    05,2633  3 7641 0           CAF     BIT15        SET CLPASS FOR PASSO ONLY
1158   REF  10 LAST 304    05,2634  54 302 1           TS      CLPASS
1159   REF   3 LAST 319    05,2635  0 2254 0           TC      REQDATY
1160                       05,2636  0 0006 1           EXTEND
1161   REF   7 LAST 320    05,2637  3 2076 1           DCA     LODNNLOC     SWITCH BANKS TO NOUN TABLE READING
1162   REF   8 LAST 320    05,2640  52 006 0           DXCH    Z            ROUTINE.
1163   REF  76 LAST 320    05,2641  3 7657 1           CAF     ONE
1164   REF   7 LAST 320    05,2642  0 2762 0           TC      PUTCOM
1165   REF  18 LAST 320    05,2643  50 131 1           INDEX   NOUNADD
1166                       05,2644  54 001 1           TS      1
1167   REF   5 LAST 320    05,2645  0 2663 0           TC      LOADLV

1168   REF  40 LAST 319    05,2646  4 7656 1  CLOAD    CS      TWO
1169   REF   8 LAST 320    05,2647  0 2376 1           TC      COMPTEST
1170   REF  24 LAST 320    05,2650  3 7641 0           CAF     BIT15        SET CLPASS FOR PASSO ONLY
1171   REF  11 LAST 320    05,2651  54 302 1           TS      CLPASS
1172   REF   3 LAST 319    05,2652  0 2256 1           TC      REQDATZ
1173                       05,2653  0 0006 1           EXTEND
1174   REF   8 LAST 320    05,2654  3 2076 1           DCA     LODNNLOC     SWITCH BANKS TO NOUN TABLE READING
1175   REF   9 LAST 320    05,2655  52 006 0           DXCH    Z            ROUTINE.
1176   REF  41 LAST 320    05,2656  3 7656 0           CAF     TWO
1177   REF   8 LAST 320    05,2657  0 2762 0           TC      PUTCOM
1178   REF  19 LAST 320    05,2660  50 131 1           INDEX   NOUNADD
1179                       05,2661  54 002 1           TS      2
1180   REF   6 LAST 320    05,2662  0 2663 0           TC      LOADLV
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 1181  REF 116 LAST 320    05,2663  3 7665 0  LOADLV   CAF    ZERO
 1182  REF  12 LAST 304    05,2664  54 265 1           TS     DECBRNCH
 1183  REF 117 LAST 321    05,2665  4 7665 1           CS     ZERO
 1184  REF   1             05,2666  54 301 1           TS     LOADSTAT
 1185  REF   4 LAST 309    05,2667  4 5237 0           CS     VD1          TO BLOCK NUMERICAL CHARACTERS AND
 1186  REF  28 LAST 318    05,2670  54 264 0           TS     DSPCOUNT     CLEARS AFTER A COMPLETED LOAD
 1187  REF  13 LAST 316    05,2671  0 4102 0           TC     POSTJUMP     AFTER COMPLETED LOAD, GO TO RECALTST
 1188  REF   1             05,2672   11422 0           CADR   RECALTST     TO SEE IF THERE IS RECALL FROM ENDIDLE.

 1189                      05,2673   00021 1  VBSP1LD  OCT    21           VB21 = ALOAD
 1190                      05,2674   00022 1  VBSP2LD  OCT    22           VB22 = BLOAD
 1191                      05,2675   00023 0  VBSP3LD  OCT    23           VB23 = CLOAD


 1192  REF  10 LAST 317    05,2676  54 103 1  ALLDC/OC TS     DECOUNT      TESTS THAT DATA WORDS LOADED ARE EITHER
 1193  REF  13 LAST 321    05,2677  4 0265 1           CS     DECBRNCH     ALL DEC OR ALL OCT. ALARMS IF NOT.
 1194  REF  25 LAST 302    05,2700  54 021 0           TS     SR
 1195  REF  26 LAST 321    05,2701  4 0021 0           CS     SR
 1196  REF  27 LAST 321    05,2702  4 0021 0           CS     SR           SHIFTED RIGHT 2
 1197  REF 211 LAST 317    05,2703  10 000 0           CCS    A            DEC COMP BITS IN LOW 3
 1198                      05,2704  1 2706 0           TCF    +2           SOME ONES IN LOW 3
 1199  REF 180 LAST 317    05,2705  0 0002 0           TC     Q            ALL ZEROS. ALL OCTAL.  OK
 1200  REF  11 LAST 321    05,2706  6 0103 0           AD     DECOUNT      DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
 1201                      05,2707  0 0006 1           EXTEND              (BUT IT HAS BEEN DECREMENTED BY CCS)
 1202                      05,2710  1 2712 0           BZF    +2           MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP.
 1203  REF  10 LAST 313    05,2711  0 2324 0           TC     GODSPALM
 1204  REF 181 LAST 321    05,2712  0 0002 0  GOQ      TC     Q            ALL REQUIRED ARE DEC. OK


 1205  REF 182 LAST 321    05,2713  56 002 0  SFRUTNOR XCH    Q            GETS SF ROUTINE NUMBER FOR NORMAL CASE
 1206  REF   1             05,2714  54 100 1           TS     EXITEM       CANT USE L FOR RETURN. TSTFORDP USES L.
 1207  REF   1             05,2715  3 5225 1           CAF    MID5
 1208  REF   2 LAST 313    05,2716  7 0133 1           MASK   NNTYPTEM
 1209  REF   1             05,2717  0 5200 0           TC     RIGHT5
 1210  REF   2 LAST 321    05,2720  0 0100 0           TC     EXITEM       SF ROUTINE NUMBER IN A

 1211  REF 183 LAST 321    05,2721  56 002 0  SFRUTMIX XCH    Q            GETS SF ROUTINE NUMBER FOR MIXED CASE
 1212  REF   3 LAST 321    05,2722  54 100 1           TS     EXITEM
 1213  REF  12 LAST 321    05,2723  50 103 0           INDEX  DECOUNT
 1214  REF   1             05,2724  3 2753 1           CAF    DISPLACE     PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1215  REF  76 LAST 313    05,2725  54 001 1           TS     L
 1216  REF  13 LAST 321    05,2726  50 103 0           INDEX  DECOUNT
 1217  REF   8 LAST 295    05,2727  3 5224 0           CAF    LOW5         LOW5, MID5, OR HI5 IN A
 1218  REF   1             05,2730  7 0137 0           MASK   RUTMXTEM     GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
 1219  REF  77 LAST 321    05,2731  50 001 0           INDEX  L
 1220                      05,2732  0 0000 1           TC     0
R1221  DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1222  REF   4 LAST 321    05,2733  0 0100 0  SFRET1   TC     EXITEM       SF ROUTINE NUMBER IN A
 1223  REF 184 LAST 321   05,2734  56 002 0  SFCONUM  XCH     Q               GETS 2X( SF CONSTANT NUMBER)
 1224  REF   5 LAST 321   05,2735  54 100 1           TS      EXITEM
 1225  REF   8 LAST 317   05,2736  50 124 0           INDEX   MIXBR
 1226                     05,2737  0 2737 0           TC      +0
 1227  REF   1            05,2740  0 2756 1           TC      CONUMNOR        NORMAL NOUN
 1228  REF  14 LAST 321   05,2741  50 103 0           INDEX   DECOUNT         MIXED NOUN
 1229  REF   2 LAST 321   05,2742  3 2753 1           CAF     DISPLACE
 1230  REF  78 LAST 321   05,2743  54 001 1           TS      L               PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
 1231  REF  15 LAST 322   05,2744  50 103 0           INDEX   DECOUNT
 1232  REF   9 LAST 321   05,2745  3 5224 0           CAF     LOW5
 1233  REF   3 LAST 321   05,2746  7 0133 1           MASK    NNTYPTEM
 1234  REF  79 LAST 322   05,2747  50 001 0           INDEX   L
 1235                     05,2750  0 0000 1           TC      0
R1236  DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
 1237                     05,2751  6 0000 1  SFRET    DOUBLE                  2X(SF CONSTANT NUMBER ) IN A
 1238  REF   6 LAST 322   05,2752  0 0100 0           TC      EXITEM

 1239  REF   1            05,2753  0 2712 1  DISPLACE TC      GOQ
 1240  REF   2 LAST 321   05,2754  0 5200 0           TC      RIGHT5
 1241  REF   3 LAST 313   05,2755  0 5207 1           TC      LEFT5

 1242  REF  10 LAST 322   05,2756  3 5224 0  CONUMNOR CAF     LOW5            NORMAL NOUN ALWAYS GETS LOW 5 OF
 1243  REF   4 LAST 322   05,2757  7 0133 1           MASK    NNTYPTEM        NNTYPTAB FOR SF CONUM.
 1244                     05,2760  6 0000 1           DOUBLE
 1245  REF   7 LAST 322   05,2761  0 0100 0           TC      EXITEM          2X( SF CONSTANT NUMBER) IN A



 1246  REF  16 LAST 322   05,2762  54 103 1  PUTCOM   TS      DECOUNT
 1247  REF 185 LAST 322   05,2763  56 002 0           XCH     Q
 1248  REF   1            05,2764  54 101 0           TS      DECRET
 1249  REF 118 LAST 321   05,2765  3 7665 0           CAF     ZERO
 1250  REF  16 LAST 317   05,2766  54 105 1           TS      OVFIND
 1251  REF  17 LAST 322   05,2767  50 103 0           INDEX   DECOUNT
 1252  REF   3 LAST 302   05,2770  56 273 1           XCH     XREGLP
 1253  REF 464 LAST 318   05,2771  54 141 1           TS      MPAC  +1
 1254  REF  18 LAST 322   05,2772  50 103 0           INDEX   DECOUNT
 1255  REF   3 LAST 314   05,2773  56 270 1           XCH     XREG
 1256  REF 465 LAST 322   05,2774  54 140 0           TS      MPAC
 1257  REF   9 LAST 322   05,2775  50 124 0           INDEX   MIXBR
 1258                     05,2776  0 2776 0           TC      +0
 1259  REF   1            05,2777  0 3023 0           TC      PUTNORM         NORMAL NOUN
R1260  IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
 1261  REF  19 LAST 322   05,3000  50 103 0           INDEX   DECOUNT         GET IDADDTAB ENTRY FOR COMPONENT K
 1262  REF   3 LAST 317   05,3001  3 0134 1           CA      IDADITEM               OF NOUN.
 1263  REF   6 LAST 317   05,3002  7 5234 0           MASK    LOW11           (ECADR)SUBK FOR CURRENT COMP OF NOUN
 1264  REF   5 LAST 308   05,3003  0 5161 1           TC      SETNCADR        ECADR INTO NOUNCADR, SETS EB, NOUNADD.
 1265                     05,3004  0 0006 1           EXTEND                  C(NOUNADD) IN A UPON RETURN
 1266  REF  20 LAST 322   05,3005  60 103 0           SU      DECOUNT         PLACE (ESUBK)-K INTO NOUNADD
 1267  REF  20 LAST 320   05,3006  54 131 0           TS      NOUNADD
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                 USER'S OWN PAGE NO. 35

 1268   REF  14 LAST 321     05,3007  10 265 1           CCS     DECBRNCH
 1269   REF   1              05,3010  0 3051 0           TC      PUTDECSF                + DEC
 1270   REF   3 LAST 314     05,3011  0 2721 1           TC      SFRUTMIX                +0  OCTAL
 1271   REF   3 LAST 313     05,3012  0 2236 1           TC      DPTEST
 1272   REF   1              05,3013  0 3040 0           TC      PUTCOM2                 NO DP
A1273                                                                                   TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1274                                                                                   +0 INTO MAJOR PART. SET NOUNADD FOR
A1275                                                                                   LOADING OCTAL WORD INTO MINOR PART.
 1276   REF  21 LAST 322     05,3014  24 131 1  PUTDPCOM INCR    NOUNADD                 DP  (ESUBK)-K+1  OR  E+1
 1277   REF  22 LAST 323     05,3015  3 0131 1           CA      NOUNADD                 NOUNADD NOW SET FOR MINOR PART
 1278   REF  21 LAST 322     05,3016  26 103 1           ADS     DECOUNT                 (ESUBK)+1  OR  E+1  INTO DECOUNT
 1279   REF 119 LAST 322     05,3017  3 7665 0           CAF     ZERO                    NOUNADD SET FOR MINOR PART
 1280   REF  22 LAST 323     05,3020  50 103 0           INDEX   DECOUNT
 1281                        05,3021  53'777 0           TS      0          -1           ZERO MAJOR PART(ESUBK OR E)
 1282   REF   2 LAST 323     05,3022  0 3040 0           TC      PUTCOM2

 1283   REF   2 LAST 304     05,3023  0 5167 1  PUTNORM  TC      SETNADD                 ECADR FROM NOUNCADR. SETS EB, NOUNADD.
 1284   REF  15 LAST 323     05,3024  10 265 1           CCS     DECBRNCH
 1285   REF   2 LAST 323     05,3025  0 3051 0           TC      PUTDECSF                + DEC
 1286   REF   3 LAST 314     05,3026  0 2713 0           TC      SFRUTNOR                +0  OCTAL
 1287   REF   4 LAST 323     05,3027  0 2236 1           TC      DPTEST
 1288   REF   3 LAST 323     05,3030  0 3034 0           TC      PUTCOM2 -4              NO DP
 1289   REF 120 LAST 323     05,3031  3 7665 0           CAF     ZERO                    DP
 1290   REF  23 LAST 323     05,3032  54 103 1           TS      DECOUNT
 1291   REF   1              05,3033  0 3014 1           TC      PUTDPCOM

 1292   REF   6 LAST 313     05,3034  3 0132 1           CA      NNADTEM
 1293   REF  77 LAST 320     05,3035  6 7657 1           AD      ONE                     IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1294                        05,3036  0 0006 1           EXTEND
 1295   REF   1              05,3037  1 3044 0           BZF     CHANLOAD
 1296   REF 466 LAST 322     05,3040  56 140 1  PUTCOM2  XCH     MPAC
 1297   REF   2 LAST 322     05,3041  0 0101 1           TC      DECRET

 1298   REF  29 LAST 321                    E0           EBANK=  DSPCOUNT
 1299                        05,3042   02045 1  GTSFINLC 2CADR   GTSFIN
C1299   REF   1              05,3043   34000 0


 1300   REF 467 LAST 323     05,3044  56 140 1  CHANLOAD XCH     MPAC
 1301                        05,3045  0 0006 1           EXTEND
 1302   REF   4 LAST 313     05,3046  5 0304 0           INDEX   NOUNCADR
 1303                        05,3047  01 000 0           WRITE   0
 1304   REF   7 LAST 320     05,3050  0 2663 0           TC      LOADLV


R1305   PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

 1306   REF   2 LAST 314     05,3051  0 2734 0  PUTDECSF TC      SFCONUM                 2X(SF CON NUMB) IN A
 1307   REF   8 LAST 317     05,3052  54 107 0           TS      SFTEMP1
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                      USER'S OWN PAGE NO.  36

  1308                         05,3053  0 0006 1           EXTEND                        SWITCH BANKS TO SF CONSTANT TABLE
  1309  REF   1                05,3054  3 3043 0           DCA      GTSFINLC             READING ROUTINE.
  1310  REF  10 LAST 320       05,3055  52 006 0           DXCH     Z                    LOADS SFTEMP1, SFTEMP2.
  1311  REF  10 LAST 322       05,3056  50 124 0           INDEX    MIXBR
  1312                         05,3057  0 3057 0           TC       +0
  1313  REF   1                05,3060  0 3063 1           TC       PUTSFNOR
  1314  REF   4 LAST 323       05,3061  0 2721 1           TC       SFRUTMIX
  1315  REF   1                05,3062  0 3064 0           TC       PUTDCSF2
  1316  REF   4 LAST 323       05,3063  0 2713 0  PUTSFNOR TC       SFRUTNOR

  1317  REF 212 LAST 321       05,3064  50 000 1  PUTDCSF2 INDEX    A
  1318  REF   1                05,3065  3 3067 0           CAF      SFINTABR
  1319  REF   8 LAST 314       05,3066  0 4105 1           TC       BANKJUMP             SWITCH BANKS FOR EXPANSHION ROOM
  1320  REF   5 LAST 317       05,3067    11277 0 SFINTABR CADR     DSPALARM             ALARM IF DEC LOAD WITH OCTAL ONLY NOUN
  1321  REF   1                05,3070    11003 1          CADR     BINROUND
  1322  REF   1                05,3071    10723 0          CADR     DEGINSF
  1323  REF   1                05,3072    10773 0          CADR     ARTHINSF
  1324  REF   1                05,3073    11023 0          CADR     DPINSF
  1325  REF   1                05,3074    11050 1          CADR     DPINSF2
  1326  REF   1                05,3075    11006 1          CADR     OPTDEGIN
  1327  REF   2 LAST 324       05,3076    11023 0          CADR     DPINSF               SAME AS ARITHDP1
  1328                                  05,3077  ENDRUTIN EQUALS


R1329   SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R1330   ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A. END WITH TC DECRET


  1331  REF   1                         04,2723           SETLOC ENDDPDEC +1

R1332   DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

  1333  REF   3 LAST 317       04,2723  0 7063 0  DEGINSF  TC       DMP                  SF ROUTINE FOR DEC DEGREES
  1334  REF   1                04,2724   02766 1           ADRES    DEGCON1              MULT BY 5.5  5(10)X2EXP-3
  1335  REF 468 LAST 323       04,2725  10 141 1           CCS      MPAC      +1         THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
  1336  REF  22 LAST 298       04,2726  3 7645 1           CAF      BIT11                LEFT 3, AND CAUSES 360.00 TO OF/UF
  1337                         04,2727  0 2731 0           TC       +2                   WHEN SHIFTED LEFT AND ALARM.
  1338  REF  23 LAST 324       04,2730  4 7645 0           CS       BIT11
  1339  REF 469 LAST 324       04,2731  6 0141 0           AD       MPAC      +1
  1340  REF   1                04,2732  0 3066 1           TC       2ROUND    +2
  1341  REF   1                04,2733  0 5263 0           TC       TPSL1                LEFT 1
  1342  REF   2 LAST 324       04,2734  0 5263 0  DEGINSF2 TC       TPSL1                LEFT 2
  1343  REF   1                04,2735  0 3075 0           TC       TESTOFUF
  1344  REF   3 LAST 324       04,2736  0 5263 0           TC       TPSL1                RETURNS IF NO OF/UF (LEFT3)
  1345  REF 470 LAST 324       04,2737  10 140 0           CCS      MPAC
  1346  REF   1                04,2740  0 2744 1           TC       SIGNFIX              IF+, GO TO SIGNFIX
  1347  REF   2 LAST 324       04,2741  0 2744 1           TC       SIGNFIX              IF +0, GO TO SIGNFIX
  1348                         04,2742  4 0000 0           COM                           IF - , USE -MAGNITUDE +1
  1349  REF 471 LAST 324   04,2743  54 140 0            TS      MPAC            IF -0, USE +0
  1350  REF  17 LAST 322   04,2744  10 105 1  SIGNFIX   CCS     OVFIND
  1351  REF   1            04,2745   0 2762 0           TC      SGNTO1          IF OVERFLOW
  1352  REF   1            04,2746   0 2756 1           TC      ENDSCALE        NO OVERFLOW/UNDERFLOW
  1353  REF 472 LAST 325   04,2747  10 140 0            CCS     MPAC            IF UF FORCE SIGN TO 0 EXCEPT -180
  1354  REF  17 LAST 315   04,2750   0 5464 1           TC      CCSHOLE
  1355  REF   1            04,2751   0 2760 1           TC      NEG180
  1356                     04,2752   0 2753 1           TC      +1
  1357  REF 473 LAST 325   04,2753  56 140 1            XCH     MPAC
  1358  REF  22 LAST 250   04,2754   7 7637 0           MASK    POSMAX
  1359  REF 474 LAST 325   04,2755  54 140 0            TS      MPAC
  1360  REF  14 LAST 321   04,2756   0 4102 0 ENDSCALE  TC      POSTJUMP
  1361  REF   4 LAST 323   04,2757    13040 1           CADR    PUTCOM2

  1362  REF  23 LAST 325   04,2760   4 7637 0 NEG180    CS      POSMAX
  1363  REF   2 LAST 325   04,2761   0 2755 1           TC      ENDSCALE  -1

  1364  REF 475 LAST 325   04,2762   4 0140 0 SGNTO1    CS      MPAC            IF OF FORCE SIGN TO 1
  1365  REF  24 LAST 325   04,2763   7 7637 0           MASK    POSMAX
  1366  REF 213 LAST 324   04,2764   4 0000 0           CS      A
  1367  REF   3 LAST 325   04,2765   0 2755 1           TC      ENDSCALE  -1

  1368                     04,2766    26161 0 DEGCON1   2DEC    5.555555555 B-3
 C1368                     04,2767    30707 1
  1369                     04,2770    21616 0 DEGCON2   2DEC    2.222222222 B-2
 C1369                     04,2771    07071 0
  1370                     04,2772    71527 1 NEG.2     OCT     -06250          = .197753906  I.E. THE BIAS SCALED

  1371  REF   4 LAST 324   04,2773   0 7063 0 ARTHINSF  TC      DMP             SCALES MPAC, +1 BY SFTEMP1, SFTEMP2.
  1372  REF   9 LAST 323   04,2774    00107 1           ADRES   SFTEMP1         ASSUMES POINT BETWEEN HI AND LO PARTS
  1373  REF 476 LAST 325   04,2775  56 142 0            XCH     MPAC     +2     OF SFCON. SHIFTS RESULTS LEFT BY 14.
  1374  REF 477 LAST 325   04,2776  56 141 0            XCH     MPAC     +1     (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
  1375  REF 478 LAST 325   04,2777  56 140 1            XCH     MPAC
  1376                     04,3000   0 0006 1           EXTEND
  1377  REF   2 LAST 324   04,3001   1 3003 0           BZF     BINROUND
  1378  REF   6 LAST 324   04,3002   0 3277 0           TC      DSPALARM        TOO LARGE A LOAD
  1379  REF   2 LAST 324   04,3003   0 3064 0 BINROUND  TC      2ROUND
  1380  REF   2 LAST 324   04,3004   0 3075 0           TC      TESTOFUF
  1381  REF   4 LAST 325   04,3005   0 2756 1           TC      ENDSCALE        RETURNS IF NO OF/UF


  1382  REF 479 LAST 325   04,3006  10 140 0  OPTDEGIN  CCS     MPAC            OPTICS SCALING ROUTINE
  1383                     04,3007   0 3013 0           TC      +4
  1384                     04,3010   0 3013 0           TC      +3
  1385  REF   7 LAST 325   04,3011   0 3277 0           TC      DSPALARM        REJECT NEGATIVE INPUT
  1386  REF   8 LAST 325   04,3012   0 3277 0           TC      DSPALARM                DITTO
  1387  REF   1            04,3013   3 2772 1 OPDEGIN2  CAF     NEG.2           RANGE IS 90 DEG
  1388  REF 480 LAST 325   04,3014  26 140 0            ADS     MPAC            SUBTRACT BIAS
  1389  REF   5 LAST 325   04,3015   0 7063 0           TC      DMP             MULT BY 100 / 45  B-2
 1390  REF    1            04,3016   02770 0           ADRES  DEGCON2
 1391  REF   16 LAST 250   04,3017  3 7644 0           CAF    BIT12               ROUND AS IN DEGINSF
 1392  REF  481 LAST 325   04,3020  6 0141 0           AD     MPAC      +1
 1393  REF    3 LAST 325   04,3021  0 3066 1           TC     2ROUND    +2
 1394  REF    1            04,3022  0 2734 0           TC     DEGINSF2

 1395  REF    6 LAST 325   04,3023  0 7063 0  DPINSF   TC     DMP                 SCALES MPAC, MPAC +1 BY SFTEMP1,
 1396  REF   10 LAST 325   04,3024   00107 1           ADRES  SFTEMP1             SFTEMP2.  STORES LOW PART OF RESULT
 1397  REF  482 LAST 326   04,3025  56 142 0           XCH    MPAC      +2        IN (E SUBK) +1 OR E+1
 1398                      04,3026  6 0000 1           DOUBLE
 1399  REF  483 LAST 326   04,3027  54 142 1           TS     MPAC      +2
 1400  REF  121 LAST 323   04,3030  3 7665 0           CAF    ZERO
 1401  REF  484 LAST 326   04,3031  6 0141 0           AD     MPAC      +1
 1402  REF    4 LAST 326   04,3032  0 3066 1           TC     2ROUND    +2
 1403  REF    3 LAST 325   04,3033  0 3075 0           TC     TESTOFUF
 1404  REF   11 LAST 324   04,3034  50 124 0           INDEX  MIXBR               RETURNS IF NO OF/UF
 1405                      04,3035  0 3035 1           TC     +0
 1406  REF    1            04,3036  0 3046 0           TC     DPINORM
 1407  REF   24 LAST 323   04,3037  3 0103 0           CA     DECOUNT             MIXEDNOUN
 1408  REF   23 LAST 323   04,3040  6 0131 1  DPINCOM  AD     NOUNADD                 MIXED                   NORMAL
 1409  REF  186 LAST 322   04,3041  54 002 1           TS     Q                     E SUBK              E
 1410  REF  485 LAST 326   04,3042  56 141 0           XCH    MPAC      +1
 1411  REF  187 LAST 326   04,3043  50 002 0           INDEX  Q
 1412                      04,3044  54 001 1           TS     1                   PLACE LOW PART IN
 1413  REF    5 LAST 325   04,3045  0 2756 1           TC     ENDSCALE            (E SUBK) +1    MIXED
 1414  REF  122 LAST 326   04,3046  3 7665 0  DPINORM  CAF    ZERO                E +1           NORMAL
 1415  REF    1            04,3047  0 3040 0           TC     DPINCOM


 1416  REF    7 LAST 326   04,3050  0 7063 0  DPINSF2  TC     DMP                 ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
 1417  REF   11 LAST 326   04,3051   00107 1           ADRES  SFTEMP1             PART OF SF CONST. DPINSF2 SHIFTS RESULTS
 1418  REF    2 LAST 317   04,3052  0 3054 0           TC     TPLEFT7             LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1.
 1419  REF    3 LAST 324   04,3053  0 3025 0           TC     DPINSF    +2


 1420  REF  188 LAST 326   04,3054  56 002 0  TPLEFT7  XCH    Q                   OPERATES ON MPAC, MPAC+1, MPAC+2
 1421  REF    1            04,3055  54 110 0           TS     SFTEMP2             CANT USE L FOR RETURN, TPSL1 USES L.
 1422  REF   11 LAST 319   04,3056  3 6162 1           CAF    SIX                 LEFT BY 7
 1423  REF   12 LAST 326   04,3057  54 107 0  LEFT7COM TS     SFTEMP1
 1424  REF    4 LAST 324   04,3060  0 5263 0           TC     TPSL1
 1425  REF   13 LAST 326   04,3061  10 107 0           CCS    SFTEMP1
 1426  REF    1            04,3062  0 3057 0           TC     LEFT7COM
 1427  REF    2 LAST 326   04,3063  0 0110 1           TC     SFTEMP2


 1428  REF  486 LAST 326   04,3064  56 141 0  2ROUND   XCH    MPAC      +1
 1429                      04,3065  6 0000 1           DOUBLE
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L          PINBALL GAME  BUTTONS AND LIGHTS                                               USER'S OWN PAGE NO.  39

   1430    REF 487 LAST 326      04,3066  54 141 1             TS       MPAC     +1
   1431    REF 189 LAST 326      04,3067   0 0002 0            TC       Q                   IF MPAC+1 DOES NOT OF/UF
   1432    REF 488 LAST 327      04,3070   6 0140 1            AD       MPAC
   1433    REF 489 LAST 327      04,3071  54 140 0             TS       MPAC
   1434    REF 190 LAST 327      04,3072   0 0002 0            TC       Q                   IF MPAC DOES NOT OF/UF
   1435    REF  18 LAST 325      04,3073  54 105 1             TS       OVFIND
   1436    REF 191 LAST 327      04,3074   0 0002 0  2RNDEND   TC       Q


   1437    REF  19 LAST 327      04,3075  10 105 1  TESTOFUF  CCS      OVFIND              RETURNS IF NO OF/UF
   1438    REF   9 LAST 325      04,3076   0 3277 0            TC       DSPALARM            OF
   1439    REF 192 LAST 327      04,3077   0 0002 0            TC       Q
   1440    REF  10 LAST 327      04,3100   0 3277 0            TC       DSPALARM            UF
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P1441    MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1442    ANY NVSUB CALL THAT PASSES THE DSPLOCK, OR ANOTHER MONITOR.

R1443    MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1444    EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1445    MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1446    NOUNCADR IN MONSAVE1, IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1447    MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT).

R1448    MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1449    IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1450    IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1451    NVSUB AND VB=TERMINATE TURN KILL MONITOR BIT ON.

R1452    IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1453    AND MONSAVE1 (TURNING OFF KILLER BIT).


R1454    MONITOR DOSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
 1455    REF   1                       05,3077             SETLOC ENDRUTIN

 1456    REF  25 LAST 320     05,3077  4 7641 1  MONITOR   CS     BIT15
 1457    REF   5 LAST 323     05,3100  7 0304 1            MASK   NOUNCADR
 1458    REF 490 LAST 327     05,3101  54 141 1  MONIT1    TS     MPAC     +1       TEMP STORAGE
 1459    REF   1              05,3102  3 3401 1            CAF    LOW6
 1460    REF  17 LAST 312     05,3103  7 0266 1            MASK   VERBREG
 1461    REF   4 LAST 322     05,3104  0 5207 1            TC     LEFT5
 1462    REF   8 LAST 295     05,3105  54 022 0            TS     CYL
 1463    REF   9 LAST 328     05,3106  56 022 1            XCH    CYL
 1464    REF   7 LAST 312     05,3107  6 0267 1            AD     NOUNREG
 1465    REF 491 LAST 328     05,3110  54 140 0            TS     MPAC              TEMP STORAGE
 1466    REF   2 LAST 157     05,3111  4 0324 0            CS     GRABLOCK          NEITHER CASE SEARCHES LIST.
 1467    REF  42 LAST 320     05,3112  6 7656 0            AD     TWO
 1468    REF 214 LAST 325     05,3113  10 000 0            CCS    A
 1469    REF   1              05,3114  0 5364 0            TC     RELDSP1           GRABLOCK=0,1. +0 INTO DSPLOCK AND
 1470                         05,3115  0 3121 0            TC     +4                TURN OFF KEY RLSE LIGHT.
 1471    REF  18 LAST 325     05,3116  0 5464 1            TC     CCSHOLE
 1472    REF 123 LAST 326     05,3117  3 7665 0            CAF    ZERO              GRABLOCK=2. +0 INTO DSPLOCK AND
 1473    REF   4 LAST 299     05,3120  54 277 1            TS     DSPLOCK           LEAVE KEY RLSE LIGHT ALONE
 1474                         05,3121  0 0004 0            INHINT
 1475    REF   2 LAST 157     05,3122  10 305 0            CCS    MONSAVE
 1476                         05,3123  0 3130 0            TC     +5                IF MONSAVE WAS +, NO REQUEST
 1477    REF  78 LAST 323     05,3124  3 7657 1            CAF    ONE               IF MONSAVE WAS 0, REQUEST MONREQ
 1478    REF  33 LAST 278     05,3125  0 4536 0            TC     WAITLIST
 1479    REF  30 LAST 323                     E0            EBANK= DSPCOUNT
 1480                         05,3126   03134 1            2CADR  MONREQ
C1480    REF   1              05,3127   12000 1
 1481    REF 492 LAST 328     05,3130  52 141 1            DXCH   MPAC              PLACE MONITOR VERB AND NOUN INTO MONSAVE
 1482   REF    3 LAST 328      05,3131  52 306 0              DXCH    MONSAVE         ZERO THE KILL MONITOR BIT
 1483                          05,3132   0 0003 1             RELINT
 1484   REF    4 LAST 303      05,3133   0 0122 0             TC      ENTRET


 1485   REF    3 LAST 286      05,3134   0 5257 1  MONREQ     TC      LODSAMPT        CALLED BY WAITLIST
 1486   REF    2 LAST 157      05,3135  10 306 0              CCS     MONSAVE1        TIME IS SNATCHED IN RUPT FOR NOUN 65
 1487                          05,3136   0 3142 0             TC      +4              IF KILLER BIT = 0, ENTER REQUESTS
 1488                          05,3137   0 3142 0             TC      +3              IF KILLER BIT = 0, ENTER REQUESTS
 1489   REF    1               05,3140   0 3153 0             TC      KILLMON         IF KILLER BIT = 1, NO REQUESTS
 1490   REF    2 LAST 329      05,3141   0 3153 0             TC      KILLMON         IF KILLER BIT = 1, NO REQUESTS
 1491   REF    1               05,3142   3 3157 1             CAF     MONDEL
 1492   REF   34 LAST 328      05,3143   0 4536 0             TC      WAITLIST        ENTER WAITLIST REQUEST FOR MONREQ
 1493   REF   31 LAST 328                       E0            EBANK=  DSPCOUNT
 1494                          05,3144    03134 1             2CADR   MONREQ
C1494   REF    2 LAST 328      05,3145    12000 1
 1495   REF    2 LAST 285      05,3146   3 5233 0             CAF     CHRPRIO
 1496   REF   13 LAST 285      05,3147   0 4363 0             TC      NOVAC           ENTER EXEC REQUEST FOR MONDO
 1497   REF   32 LAST 329                       E0            EBANK=  DSPCOUNT
 1498                          05,3150    03160 0             2CADR   MONDO
C1498   REF    1               05,3151    12000 1
 1499   REF   25 LAST 279      05,3152   0 4602 1             TC      TASKOVER

 1500   REF  124 LAST 328      05,3153   3 7665 0  KILLMON    CAF     ZERO            ZERO MONSAVE AND TURN KILLER BIT OFF
 1501   REF    4 LAST 329      05,3154  54 305 0              TS      MONSAVE
 1502   REF    3 LAST 329      05,3155  54 306 0              TS      MONSAVE1        TURN OFF KILL MONITOR BIT.
 1503   REF   26 LAST 329      05,3156   0 4602 1             TC      TASKOVER


 1504                          05,3157    00144 0  MONDEL     OCT     144             FOR 1 SEC MONITOR INTERVALS


 1505   REF    4 LAST 329      05,3160  10 306 0   MONDO      CCS     MONSAVE1        CALLED BY EXEC
 1506                          05,3161   0 3165 0             TC      +4              IF KILLER BIT = 0, CONTINUE
 1507                          05,3162   0 3165 0             TC      +3              IF KILLER BIT = 0, CONTINUE
 1508   REF   36 LAST 301      05,3163   0 4440 0             TC      ENDOFJOB        IN CASE TERMINATE CAME SINCE LAST MONREQ
 1509   REF   37 LAST 329      05,3164   0 4440 0             TC      ENDOFJOB        IN CASE TERMINATE CAME SINCE LAST MONREQ
 1510   REF    5 LAST 328      05,3165  10 277 1              CCS     DSPLOCK
 1511   REF    1               05,3166   0 3212 0             TC      MONBUSY         NVSUB IS BUSY
 1512   REF    2 LAST 328      05,3167   3 3401 1             CAF     LOW6            NVSUB IS AVAILABLE
 1513   REF    5 LAST 329      05,3170   7 0305 0             MASK    MONSAVE
 1514   REF    3 LAST 266      05,3171  54 107 0              TS      NVTEMP
 1515   REF    2 LAST 266      05,3172   0 5123 1             TC      NVSUBMON        PLACE NOUN INTO NOUNREG AND DISPLAY IT
 1516   REF   38 LAST 329      05,3173   0 4440 0             TC      ENDOFJOB        IN CASE OF ALARM DURING DISPLAY
 1517   REF    1               05,3174   3 3210 1             CAF     MONMASK
 1518   REF    6 LAST 329      05,3175   7 0305 0             MASK    MONSAVE         CHANGE MONITOR VERB TO DISPLAY VERB
 1519   REF    3 LAST 322      05,3176   0 5200 0             TC      RIGHT5
 1520   REF  30 LAST 119    05,3177  54 020 1              TS      CYR
 1521   REF  31 LAST 330    05,3200  56 020 0              XCH     CYR
 1522   REF  18 LAST 328    05,3201  54 266 1              TS      VERBREG
 1523   REF   1             05,3202  3 3211 0              CAF     MONBACK        SET RETURN TO PASTEVB AFTER DATA DISPLAY
 1524   REF   5 LAST 329    05,3203  54 122 1              TS      ENTRET
 1525   REF  26 LAST 328    05,3204  4 7641 1              CS      BIT15
 1526   REF   5 LAST 329    05,3205  7 0306 0              MASK    MONSAVE1       PUT ECADR INTO MPAC +2. INTMCTBS WILL
 1527   REF 493 LAST 328    05,3206  54 142 1              TS      MPAC     +2    DISPLAY IT AND SET NOUNCADR, NOUNADD,
 1528   REF   1             05,3207  0 2037 1  ENDMONDO    TC      TESTNN         EBANK.

 1529   REF   1                         5100               SETLOC  ENDRMODF

 1530   REF   1                5100  3 5106 0  PASTEVB     CAF     MIDSIX
 1531   REF   7 LAST 329       5101  7 0305 0              MASK    MONSAVE
 1532   REF   4 LAST 329       5102  54 107 0              TS      NVTEMP         PLACE MONITOR VERB INTO VERBREG AND
 1533   REF   3 LAST 329       5103  0 5123 1              TC      NVSUBMON            DISPLAY IT.
 1534                          5104  0 5105 0              TC      +1             IN CASE OF ALARM DURING DISPLAY
 1535   REF  39 LAST 329       5105  0 4440 0  ENDPASTE    TC      ENDOFJOB

 1536                          5106   07700 1  MIDSIX      OCTAL   07700



 1537   REF   1                      05,3210               SETLOC  ENDMONDO +1
 1538                       05,3210   00700 0  MONMASK     OCT     700
 1539   REF   1             05,3211   05100 0  MONBACK     ADRES   PASTEVB

 1540   REF   1             05,3212  0 5253 0  MONBUSY     TC      RELDSPON       TURN KEY RELEASE LIGHT
 1541   REF  40 LAST 330    05,3213  0 4440 0              TC      ENDOFJOB



R1542   DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
R1543   IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
R1544   DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

 1545   REF   7 LAST 318    05,3214  3 5175 1  DSPFMEM     CAF     R1D1           IF F/F, DATACALL USES BANK 02 OR 03.
 1546   REF  33 LAST 329    05,3215  54 264 0              TS      DSPCOUNT
 1547   REF   6 LAST 328    05,3216  3 0304 0              CA      NOUNCADR       ORIGINAL FCADR LOADED STILL IN NOUNCADR.
 1548   REF   1             05,3217  0 4116 0              TC      DATACALL
 1549   REF   3 LAST 312    05,3220  0 3222 0              TC      DSPOCTWD
 1550   REF  41 LAST 330    05,3221  0 4440 0              TC      ENDOFJOB
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P1551      DSPDECWD CONVERTS C(MPAC) AND C(MPAC +1)TO A SIGN AND 5 CHAR DECIMAL
R1552      STARTING IN LOC SPECIFIED IN DSPCOUNT

 1553      REF   4 LAST 326              04,3101                 SETLOC TESTOFUF +4

 1554      REF 193 LAST 327    04,3101   56 002 0  DSPDECWD XCH    Q                     USES SHORTMP THROUGHOUT
 1555      REF   1             04,3102   54 101 0           TS     WDRET                 CANT USE L FOR RETURN.+ON USES L.
 1556      REF 494 LAST 330    04,3103   10 140 0           CCS    MPAC
 1557                          04,3104   0 3113 1           TC     +7
 1558                          04,3105   0 3113 1           TC     +6
 1559      REF  79 LAST 328    04,3106   6 7657 1           AD     ONE
 1560      REF 495 LAST 331    04,3107   54 140 0           TS     MPAC
 1561      REF   2 LAST 298    04,3110   0 2313 1           TC     -ON
 1562      REF 496 LAST 331    04,3111   4 0141 1           CS     MPAC  +1
 1563                          04,3112   0 3115 1           TC     +3
 1564      REF   2 LAST 298    04,3113   0 2273 0           TC     +ON
 1565      REF 497 LAST 331    04,3114   56 141 0           XCH    MPAC     +1
 1566      REF   1             04,3115   6 3154 1           AD     DECROUND
 1567      REF 498 LAST 331    04,3116   54 141 1           TS     MPAC     +1
 1568      REF 125 LAST 329    04,3117   3 7665 0           CAF    ZERO
 1569      REF 499 LAST 331    04,3120   6 0140 1           AD     MPAC
 1570      REF 500 LAST 331    04,3121   54 140 0           TS     MPAC
 1571                          04,3122   0 3126 1           TC     +4
 1572      REF  25 LAST 325    04,3123   3 7637 1           CAF    POSMAX
 1573      REF 501 LAST 331    04,3124   54 140 0           TS     MPAC
 1574      REF 502 LAST 331    04,3125   54 141 1           TS     MPAC     +1
 1575      REF   8 LAST 215    04,3126   3 7655 0           CAF    FOUR
 1576      REF   1             04,3127   54 123 0  DSPDCWD1 TS     WDCNT
 1577      REF   2 LAST 300    04,3130   3 5242 0           CAF    BINCON
 1578      REF   4 LAST 316    04,3131   0 7266 1           TC     SHORTMP
 1579      REF 503 LAST 331    04,3132   50 140 1  TRACE1   INDEX  MPAC
 1580      REF   3 LAST 295    04,3133   3 4741 1           CAF    RELTAB
 1581      REF  11 LAST 322    04,3134   7 5224 1           MASK   LOW5
 1582      REF   5 LAST 302    04,3135   54 110 0           TS     CODE
 1583      REF 126 LAST 331    04,3136   3 7665 0           CAF    ZERO
 1584      REF 504 LAST 331    04,3137   56 142 0           XCH    MPAC     +2
 1585      REF 505 LAST 331    04,3140   56 141 0           XCH    MPAC     +1
 1586      REF 506 LAST 331    04,3141   54 140 0           TS     MPAC
 1587      REF  34 LAST 330    04,3142   56 264 1           XCH    DSPCOUNT
 1588      REF   3 LAST 302    04,3143   54 127 1  TRACE1S  TS     COUNT
 1589      REF 215 LAST 328    04,3144   10 000 0           CCS    A                     DECREMENT DSPCOUNT EXCEPT AT +0
 1590      REF  35 LAST 331    04,3145   54 264 0           TS     DSPCOUNT
 1591      REF   3 LAST 302    04,3146   0 3201 1           TC     DSPIN
 1592      REF   2 LAST 331    04,3147   10 123 0           CCS    WDCNT
 1593      REF   1             04,3150   0 3127 0           TC     DSPDCWD1
 1594      REF   5 LAST 321    04,3151   4 5237 0           CS     VD1
 1595      REF  36 LAST 331    04,3152   54 264 0           TS     DSPCOUNT
 1596      REF   2 LAST 331    04,3153   0 0101 1           TC     WDRET

 1597                          04,3154   02476 0   DECROUND OCT    02476
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R1598    DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
R1599    STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

 1600    REF 194 LAST 331      04,3155   56 002 0  DSP2DEC   XCH      Q
 1601    REF   3 LAST 331      04,3156   54 101 0            TS       WDRET          MUST USE SAME RETURN AS DSPDECWD
 1602    REF 127 LAST 331      04,3157   3 7665 0            CAF      ZERO
 1603    REF   6 LAST 331      04,3160   54 110 0            TS       CODE
 1604    REF  10 LAST 303      04,3161   3 6165 0            CAF      THREE
 1605    REF   3 LAST 298      04,3162   0 3263 0            TC       11DSPIN        -R2 OFF
 1606    REF   9 LAST 331      04,3163   3 7655 0            CAF      FOUR
 1607    REF   4 LAST 332      04,3164   0 3263 0            TC       11DSPIN        +R2 OFF
 1608    REF 507 LAST 331      04,3165   10 140 0            CCS      MPAC
 1609                          04,3166   0 3176 1            TC       +8D
 1610                          04,3167   0 3176 1            TC       +7
 1611    REF  80 LAST 331      04,3170   6 7657 1            AD       ONE
 1612    REF 508 LAST 332      04,3171   54 140 0            TS       MPAC
 1613    REF   3 LAST 331      04,3172   0 2313 1            TC       -ON
 1614    REF 509 LAST 332      04,3173   4 0141 1            CS       MPAC   +1
 1615    REF 510 LAST 332      04,3174   54 141 1            TS       MPAC   +1
 1616                          04,3175   0 3177 0            TC       +2
 1617    REF   3 LAST 331      04,3176   0 2273 0            TC       +ON
 1618    REF   3 LAST 308      04,3177   3 5176 1            CAF      R2D1
 1619    REF   2 LAST 331      04,3200   0 3127 0  END2DEC   TC       DSPDCWD1


 1620    REF   2 LAST 305                05,3222             SETLOC DSPFMEM +6
R1621    DSPOCTWD DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R1622    CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.

 1623    REF  10 LAST 328      05,3222   54 022 0  DSPOCTWD  TS       CYL
 1624    REF 195 LAST 332      05,3223   56 002 0            XCH      Q
 1625    REF   4 LAST 332      05,3224   54 101 0            TS       WDRET          MUST USE SAME RETURN AS DSP2BIT.
 1626    REF  31 LAST 245      05,3225   3 7642 0            CAF      BIT14          TO BLANK SIGNS
 1627    REF  37 LAST 331      05,3226   26 264 0            ADS      DSPCOUNT
 1628    REF  10 LAST 332      05,3227   3 7655 0            CAF      FOUR
 1629    REF   3 LAST 331      05,3230   54 123 0  WDAGAIN   TS       WDCNT
 1630    REF  11 LAST 332      05,3231   4 0022 0            CS       CYL
 1631    REF  12 LAST 332      05,3232   4 0022 0            CS       CYL
 1632    REF  13 LAST 332      05,3233   4 0022 0            CS       CYL
 1633    REF 216 LAST 331      05,3234   4 0000 0            CS       A
 1634    REF   1               05,3235   7 7663 1            MASK     DSPMSK
 1635    REF 217 LAST 332      05,3236   50 000 1            INDEX    A
 1636    REF   4 LAST 331      05,3237   3 4741 1            CAF      RELTAB
 1637    REF  12 LAST 331      05,3240   7 5224 1            MASK     LOW5
 1638    REF   7 LAST 332      05,3241   54 110 0            TS       CODE
 1639    REF  38 LAST 332      05,3242   56 264 1            XCH      DSPCOUNT
 1640    REF   4 LAST 331      05,3243   54 127 1            TS       COUNT
 1641    REF 218 LAST 332      05,3244   10 000 0            CCS      A              DECREMENT DSPCOUNT EXCEPT AT +0
 1642    REF  39 LAST 332      05,3245   54 264 0            TS       DSPCOUNT
```

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L        PINBALL GAME  BUTTONS AND LIGHTS                                                          USER'S OWN PAGE NO. 45

  1643   REF  15 LAST 325      05,3246  0 4102 0            TC      POSTJUMP
  1644   REF   1               05,3247   11271 0            CADR    DSPOCTIN
  1645   REF   4 LAST 332      05,3250  10 123 0  OCTBACK   CCS     WDCNT
  1646   REF   1               05,3251  0 3230 0            TC      WDAGAIN          +
  1647   REF   6 LAST 331      05,3252  4 5237 0  DSPLV     CS      VD1              TO BLOCK NUMERICAL CHARACTERS, CLEARS,
  1648   REF  40 LAST 332      05,3253  54 264 0            TS      DSPCOUNT         AND SIGNS AFTER A COMPLETED DISPLAY.
  1649   REF   5 LAST 332      05,3254  0 0101 1            TC      WDRET

  1650   REF   7 LAST 201                  7663  DSPMSK    =       SEVEN


 R1651   DSP2BIT DISPLAYS C(A) UPON ENTRY AS A 2 CHAR OCT BEGINNING IN THE DSP
 R1652   LOC SPECIFIED IN DSPCOUNT BY PRE CYCLING RIGHT C(A) AND USING THE LOGIC
 R1653   OF THE 5 CHAR OCTAL DISPLAY

  1654   REF  32 LAST 330      05,3255  54 020 1  DSP2BIT   TS      CYR
  1655   REF 196 LAST 332      05,3256  56 002 0            XCH     Q
  1656   REF   6 LAST 333      05,3257  54 101 0            TS      WDRET            CANT USE L AS RETURN. UPDATNN USES L.
  1657   REF  81 LAST 332      05,3260  3 7657 1            CAF     ONE
  1658   REF   5 LAST 333      05,3261  54 123 0            TS      WDCNT
  1659   REF  33 LAST 333      05,3262  4 0020 1            CS      CYR
  1660   REF  34 LAST 333      05,3263  4 0020 1            CS      CYR
  1661   REF  35 LAST 333      05,3264  56 020 0            XCH     CYR
  1662   REF  14 LAST 332      05,3265  54 022 0            TS      CYL
  1663   REF   2 LAST 333      05,3266  0 3235 0            TC      WDAGAIN +5


 R1664   FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE. BOTH
 R1665   ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
 R1666   FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
 R1667   DSPTAB ENTRY INTO DSREL.

  1668   REF   1                      04,3201               SETLOC END2DEC  +1

  1669   REF 197 LAST 333      04,3201  56 002 0  DSPIN     XCH     Q                CANT USE L FOR RETURN, SINCE MANY OF THE
  1670   REF   1               04,3202  54 100 1            TS      DSEXIT           ROUTINES CALLING DSPIN USE L AS RETURN.
  1671   REF  13 LAST 332      04,3203  3 5224 0            CAF     LOW5
  1672   REF   5 LAST 332      04,3204  7 0127 1            MASK    COUNT
  1673   REF  28 LAST 321      04,3205  54 021 0            TS      SR
  1674   REF  29 LAST 333      04,3206  56 021 1            XCH     SR
  1675   REF   1               04,3207  54 125 0            TS      DSREL
  1676   REF  27 LAST 286      04,3210  3 7657 1            CAF     BIT1
  1677   REF   6 LAST 333      04,3211  7 0127 1            MASK    COUNT
  1678   REF 219 LAST 332      04,3212  10 000 0            CCS     A
  1679                         04,3213  0 3215 1            TC      +2               LEFT IF COUNT IS ODD
  1680   REF   1               04,3214  0 3225 1            TC      DSPIN1  -1       RIGHT IF COUNT IS EVEN
  1681   REF   8 LAST 332      04,3215  56 110 1            XCH     CODE
  1682   REF   1               04,3216  0 5216 1            TC      SLEFT5           DOES NOT USE CYL
```

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L       PINBALL GAME  BUTTONS AND LIGHTS                                                   USER'S OWN PAGE NO.  46

 1683   REF    9 LAST 333    04,3217  54 110 0             TS       CODE
 1684   REF   32 LAST 332    04,3220  3 7642 0             CAF      BIT14
 1685   REF    7 LAST 333    04,3221  7 0127 1             MASK     COUNT
 1686   REF  220 LAST 333    04,3222  10 000 0             CCS      A
 1687   REF   43 LAST 328    04,3223  3 7656 0             CAF      TWO              BIT14 = 1, BLANK SIGN
 1688   REF   82 LAST 333    04,3224  6 7657 1             AD       ONE              BIT14 = 0, LEAVE SIGN ALONE
 1689   REF    8 LAST 334    04,3225  54 127 1             TS       COUNT            +0 INTO COUNT FOR RIGHT
A1690                                                                                 +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
A1691                                                                                 +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
 1692                        04,3226  0 0004 0  DSPIN1     INHINT
 1693   REF    2 LAST 333    04,3227  50 125 1             INDEX    DSREL
 1694   REF   24 LAST 302    04,3230  10 307 1             CCS      DSPTAB
 1695                        04,3231  0 3233 0             TC       +2               IF +
 1696   REF   19 LAST 328    04,3232  0 5464 1             TC       CCSHOLE
 1697   REF   83 LAST 334    04,3233  6 7657 1             AD       ONE              IF-
 1698   REF    1             04,3234  54 126 0             TS       DSMAG
 1699   REF    9 LAST 334    04,3235  50 127 0             INDEX    COUNT
 1700   REF    1             04,3236  7 3257 0             MASK     DSMSK
 1701                        04,3237  0 0006 1             EXTEND
 1702   REF   10 LAST 334    04,3240  60 110 1             SU       CODE
 1703                        04,3241  0 0006 1             EXTEND
 1704   REF    1             04,3242  1 3255 1             BZF      DSLV             SAME
 1705   REF   10 LAST 334    04,3243  50 127 0  DFRNT      INDEX    COUNT
 1706   REF    2 LAST 334    04,3244  4 3257 0             CS       DSMSK            MASK WITH 77740,76037, OR 75777
 1707   REF    2 LAST 334    04,3245  7 0126 0             MASK     DSMAG
 1708   REF   11 LAST 334    04,3246  6 0110 1             AD       CODE
 1709   REF  221 LAST 334    04,3247  4 0000 0             CS       A
 1710   REF    3 LAST 334    04,3250  50 125 1             INDEX    DSREL
 1711   REF   25 LAST 334    04,3251  56 307 0             XCH      DSPTAB
 1712                        04,3252  0 0006 1             EXTEND
 1713   REF    2 LAST 334    04,3253  6 3255 0             BZMF     DSLV             DSPTAB ENTRY WAS -
 1714   REF    6 LAST 302    04,3254  24 303 1             INCR     NOUT             DSPTAB ENTRY WAS +
 1715                        04,3255  0 0003 1  DSLV       RELINT
 1716   REF    2 LAST 333    04,3256  0 0100 0             TC       DSEXIT

 1717                        04,3257   00037 0  DSMSK      OCT      37
 1718                        04,3260   01740 0             OCT      1740
 1719                        04,3261   02000 0             OCT      2000
 1720                        04,3262   03740 1             OCT      3740


R1721   FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
R1722   BIT11 OF CODE.

 1723   REF    4 LAST 334    04,3263  54 125 0  11DSPIN    TS       DSREL
 1724   REF   44 LAST 334    04,3264  3 7656 0             CAF      TWO
 1725   REF   11 LAST 334    04,3265  54 127 1             TS       COUNT
 1726   REF  198 LAST 333    04,3266  56 002 0             XCH      Q                MUST USE SAME RETURN AS DSPIN
 1727   REF    3 LAST 334    04,3267  54 100 1             TS       DSEXIT
 1728   REF    2 LAST 333      04,3270  0 3226 1            TC      DSPIN1


 1729   REF    4 LAST 331      04,3271  0 3201 1  DSPOCTIN TC      DSPIN              SO DSPOCTWD DOESNT USE SWCALL
 1730                          04,3272  3 3274 0           CAF     +2
 1731   REF    9 LAST 324      04,3273  0 4105 1           TC      BANKJUMP
 1732   REF    1               04,3274   13250 1  ENDSPOCT CADR    OCTBACK


R1733   DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R1734   ABORT WITH 01501.
R1735   DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R1736   DO TC ENTRET.

 1737   REF    5 LAST 308      04,3275  3 5150 0  CHARALRM CAF     ENDINST            ALARMS WHICH MUST DO ENDOFJOBS COME
 1738   REF    6 LAST 330      04,3276  54 122 1           TS      ENTRET             HERE. ALLOWS ENTRET TO BE TEMP ERASABLE

 1739   REF    3 LAST 259      04,3277  0 5243 1  DSPALARM TC      FALTON             TURN ON OPERATOR ERROR LIGHT
 1740   REF    1               04,3300  4 3307 1           CS      NVSBENDL
 1741   REF    7 LAST 318      04,3301  6 0122 0           AD      ENTEXIT
 1742                          04,3302  0 0006 1           EXTEND
 1743                          04,3303  1 3305 0           BZF     +2                 NVSUB INITIATED. ABORT
 1744   REF    8 LAST 335      04,3304  0 0122 0           TC      ENTEXIT            NOT NVSUB INITIATED.
 1745   REF    8 LAST 218      04,3305  0 5446 1           TC      ABORT
 1746                          04,3306   01501 1           OCT     01501
 1747   REF    1               04,3307  0 5127 0  NVSBENDL TC      NVSUBEND


R1748   MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
R1749   IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
R1750   M M LIGHTS.

 1751   REF    2 LAST 309               05,3267            SETLOC  DSP2BIT  +10D

 1752   REF    1               05,3267  0 3302 0  MMCHANG  TC      REQMM
 1753   REF  128 LAST 332      05,3270  3 7665 0           CAF     ZERO
 1754   REF    8 LAST 328      05,3271  56 267 1           XCH     NOUNREG
 1755   REF  511 LAST 332      05,3272  54 140 0           TS      MPAC
 1756   REF    3 LAST 308      05,3273  3 5240 1           CAF     ND1
 1757   REF   41 LAST 333      05,3274  54 264 0           TS      DSPCOUNT
 1758   REF   21 LAST 314      05,3275  0 4063 0           TC      BANKCALL
 1759   REF    4 LAST 302      05,3276   10541 0           CADR    2BLANK
 1760   REF  512 LAST 335      05,3277  3 0140 1           CA      MPAC
 1761   REF   16 LAST 333      05,3300  0 4102 0           TC      POSTJUMP
 1762   REF    1               05,3301   11277 0           CADR    MODROUTB           GO THRU STANDARD LOC.
 1763  REF  11 LAST 327              04,3277  MODROUTB =         DSPALARM         **FIX LATER**
 1764  REF 199 LAST 334    05,3302  4 0002 1  REQMM     CS       Q
 1765  REF   9 LAST 308    05,3303  54 300 0            TS       REQRET
 1766  REF   4 LAST 335    05,3304  3 5240 1            CAF      ND1
 1767  REF  42 LAST 335    05,3305  54 264 0            TS       DSPCOUNT
 1768  REF 129 LAST 335    05,3306  3 7665 0            CAF      ZERO
 1769  REF   9 LAST 335    05,3307  54 267 0            TS       NOUNREG
 1770  REF  22 LAST 335    05,3310  0 4063 0            TC       BANKCALL
 1771  REF   5 LAST 335    05,3311   10541 0            CADR     2BLANK
 1772  REF   5 LAST 308    05,3312  0 5274 0            TC       FLASHON
 1773  REF   9 LAST 335    05,3313  0 0122 0            TC       ENTEXIT


R1774  V3RQEXEC ENTERS REQUEST TO EXEC     FOR ANY ADDRESS WITH ANY PRIORITY.
R1775  IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
R1776  IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R1777  COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
R1778  COMPONENT 2  JOB ADRES (12 BIT )
R1779  COMPONENT 3  BBCON

 1780  REF  28 LAST 333    05,3314  3 7657 1  VBRQEXEC CAF      BIT1
 1781  REF   4 LAST 276    05,3315  7 0333 0            MASK     DSPTEM1
 1782  REF 222 LAST 334    05,3316  10 000 0            CCS      A
 1783  REF   1             05,3317  0 3336 1            TC       SETVAC           IF BIT1 = 1, FINDVAC
 1784  REF   1             05,3320  3 5227 0            CAF      TCNOVAC          IF BIT1 = 0, NOVAC
 1785  REF 513 LAST 335    05,3321  54 140 0  REQEX1    TS       MPAC             TC NOVAC  OR  TC FINDVAC INTO MPAC
 1786  REF  29 LAST 336    05,3322  4 7657 0            CS       BIT1
 1787  REF   5 LAST 336    05,3323  7 0333 0            MASK     DSPTEM1
 1788  REF 514 LAST 336    05,3324  54 144 1            TS       MPAC     +4      PRIO INTO MPAC+4 AS A TEMP
 1789  REF   2 LAST 305    05,3325  0 5341 1  REQUESTC  TC       RELDSP
 1790  REF   6 LAST 335    05,3326  3 5150 0            CA       ENDINST
 1791  REF 515 LAST 336    05,3327  54 143 0            TS       MPAC     +3      TC ENDOFJOB INTO MPAC+3
 1792                      05,3330  0 0006 1            EXTEND
 1793  REF   6 LAST 336    05,3331  3 0335 1            DCA      DSPTEM1  +1      JOB ADRES INTO MPAC+1
 1794  REF 516 LAST 336    05,3332  52 142 1            DXCH     MPAC     +1      BBCON INTO MPAC+2
 1795  REF 517 LAST 336    05,3333  3 0144 0            CA       MPAC     +4      PRIO IN A
 1796                      05,3334  0 0004 0            INHINT
 1797  REF 518 LAST 336    05,3335  0 0140 1            TC       MPAC

 1798  REF   1             05,3336  3 5232 1  SETVAC    CAF      TCFINDVC
 1799  REF   1             05,3337  0 3321 1            TC       REQEX1

R1800  V3RQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
R1801  IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
R1802  IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R1803  COMPONENT 1  DELAY (LOW BITS)
R1804  COMPONENT 2  TASK ADRES (12 3IT)
R1805  COMPONENT 3  BBCON
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L        PINBALL GAME  BUTTONS AND LIGHTS                                                   USER'S OWN PAGE NO.  49

 1806    REF   1               05,3340  3 5230 0  VBRQWAIT CAF     TCWAIT
 1807    REF 519 LAST 336      05,3341  54 140 0           TS      MPAC                TC WAITLIST INTO MPAC
 1808    REF   7 LAST 336      05,3342  3 0333 1           CA      DSPTEM1             TIME DELAY
 1809    REF   1               05,3343  0 3324 1  ENDRQWT  TC      REQUESTC -1

R1810    REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R1811    TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R1812    LEAVE IT IN A, INHINT AND TC MPAC.


 1813    REF   2 LAST 335               04,3310            SETLOC  NVSBENDL +1
 1814    REF  84 LAST 334      04,3310  3 7657 1  VBPROC   CAF     ONE                 PROCEED WITHOUT DATA
 1815    REF   2 LAST 321      04,3311  54 301 1           TS      LOADSTAT
 1816    REF   3 LAST 336      04,3312  0 5341 1           TC      RELDSP
 1817    REF   3 LAST 303      04,3313  0 5300 1           TC      FLASHOFF
 1818    REF   2 LAST 321      04,3314  0 3422 0           TC      RECALTST            SEE IF THERE IS ANY RECALL FROM ENDIDLE


 1819    REF   1               04,3315  0 5131 1  VBTERM   TC      KILMONON            TURN ON KILL MONITOR BIT
 1820    REF  85 LAST 337      04,3316  4 7657 0           CS      ONE
 1821    REF   2 LAST 306      04,3317  0 3311 1           TC      VBPROC  +1          TERM VERB SETS LOADSTAT NEG


R1822    FLASH IS TURNED OFF ONLY BY PROCEED WITHOUT DATA, TERMINATE, END OF LOAD


R1823    VBRELDSP TURNS OFF RELEASE DISPLAY SYSTEM LIGHT(AND SEARCHES LIST ONLY
R1824    IF THIS LIGHT WAS TURNED ON BY NVSUBUSY), AND TURNS OFF UPACT LIGHT.

 1825    REF  13 LAST 286      04,3320  4 7655 1  VBRELDSP CS      BIT3
 1826                          04,3321  0 0006 1           EXTEND
 1827    REF   7 LAST 300      04,3322  03 011 1           WAND    DSALMOUT            TURN OFF UPACT LIGHT
 1828    REF   4 LAST 337      04,3323  0 5341 1           TC      RELDSP              SEARCHES LIST
 1829    REF  42 LAST 330      04,3324  0 4440 0           TC      ENDOFJOB


R1830    BUMP SHIFTS WORD DISPLAYED IN R2 TO R3, R1 TO R2. IT BLANKS R1.

 1831    REF   5 LAST 319      04,3325  3 7664 1  BUMP     CAF     FIVE                R2D5
 1832    REF  43 LAST 336      04,3326  54 264 0           TS      DSPCOUNT
 1833    REF  12 LAST 334      04,3327  54 127 1           TS      COUNT
 1834    REF  86 LAST 337      04,3330  3 7657 1           CAF     ONE                 SHIFT DATA OF R2 TO R3, R1 TO R2
 1835    REF  13 LAST 337      04,3331  7 0127 1           MASK    COUNT
 1836    REF  14 LAST 337      04,3332  56 127 0           XCH     COUNT               +0 INTO COUNT IF EVEN (RIGHT)
 1837    REF  30 LAST 333      04,3333  54 021 0           TS      SR                  +1 INTO COUNT IF ODD (LEFT)
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                  USER'S OWN PAGE NO.  50

 1838   REF  31 LAST 337    04,3334  56 021 1          XCH     SR                DSREL IN A
 1839   REF 223 LAST 336    04,3335  50 000 1          INDEX   A
 1840   REF  26 LAST 334    04,3336  10 307 1          CCS     DSPTAB
 1841                       04,3337  0 3341 1          TC      +2
 1842   REF  20 LAST 334    04,3340  0 5464 1          TC      CCSHOLE
 1843   REF  87 LAST 337    04,3341  6 7657 1          AD      ONE               DSMAG IN A
 1844   REF  15 LAST 337    04,3342  50 127 0          INDEX   COUNT
 1845   REF   3 LAST 334    04,3343  7 3257 0          MASK    DSMSK
 1846   REF  16 LAST 338    04,3344  50 127 0          INDEX   COUNT
 1847                       04,3345  0 3346 0          TC      +1
 1848                       04,3346  0 3350 1          TC      +2                EVEN(RIGHT)  OK
 1849   REF   4 LAST 329    04,3347  0 5200 0          TC      RIGHT5            ODD(LEFT)  SHIFT RIGHT
 1850   REF  12 LAST 334    04,3350  54 110 0          TS      CODE
 1851   REF   6 LAST 337    04,3351  4 7664 0          CS      FIVE
 1852   REF  44 LAST 337    04,3352  6 0264 1          AD      DSPCOUNT          DSPCOUNT-5
 1853   REF 224 LAST 338    04,3353  10 000 0          CCS     A                 TO PREVENT -0
 1854   REF  88 LAST 338    04,3354  6 7657 1          AD      ONE
 1855                       04,3355  0 3357 0          TC      +2
 1856   REF  21 LAST 338    04,3356  0 5464 1          TC      CCSHOLE
 1857   REF  17 LAST 338    04,3357  54 127 1          TS      COUNT
 1858   REF   5 LAST 335    04,3360  0 3201 1          TC      DSPIN             CODE ALREADY IN CODE
 1859   REF  45 LAST 338    04,3361  4 0264 0          CS      DSPCOUNT
 1860   REF   8 LAST 330    04,3362  6 5175 1          AD      R1D1              OCT 16
 1861   REF 225 LAST 338    04,3363  10 000 0          CCS     A
 1862   REF  46 LAST 338    04,3364  56 264 1          XCH     DSPCOUNT          +, DSPCOUNT L/ OCT 16
 1863   REF  89 LAST 338    04,3365  6 7657 1          AD      ONE               INCREMENT DSPCOUNT
 1864   REF   2 LAST 305    04,3366  0 3326 0          TC      BUMP     +1

 1865   REF 130 LAST 336    04,3367  3 7665 0  SWSGN   CAF     ZERO              -0, DSPCOUNT= OCT 16, DO SIGN SHIFT
 1866   REF  47 LAST 338    04,3370  54 264 0          TS      DSPCOUNT
 1867   REF   1             04,3371  6 3420 1          AD      SWTAB    +2       OCT 3
 1868   REF 226 LAST 338    04,3372  50 000 1          INDEX   A                 PICKUP ORDER , DSREL=3,4,5,6.
 1869   REF  27 LAST 338    04,3373  10 307 1          CCS     DSPTAB                      (-R2,+R2,-R1,+R1)
 1870                       04,3374  0 3376 0          TC      +2
 1871   REF  22 LAST 338    04,3375  0 5464 1          TC      CCSHOLE
 1872   REF  90 LAST 338    04,3376  6 7657 1          AD      ONE
 1873   REF  24 LAST 324    04,3377  7 7645 0          MASK    BIT11
 1874   REF  13 LAST 338    04,3400  54 110 0          TS      CODE
 1875   REF  48 LAST 338    04,3401  50 264 1          INDEX   DSPCOUNT
 1876   REF   2 LAST 338    04,3402  3 3416 1          CAF     SWTAB             PUT AWAY ORDER, DSREL= 0,1,3,4.
 1877   REF   5 LAST 332    04,3403  0 3263 0          TC      11DSPIN                     (-R3,+R3,-R2,+R2.)
 1878   REF  49 LAST 338    04,3404  4 0264 0          CS      DSPCOUNT
 1879   REF   3 LAST 338    04,3405  6 3420 1          AD      SWTAB    +2       OCT 3
 1880   REF 227 LAST 338    04,3406  10 000 0          CCS     A
 1881   REF  50 LAST 338    04,3407  56 264 1          XCH     DSPCOUNT          +, DSPCOUNT L/ 3
 1882   REF  91 LAST 338    04,3410  6 7657 1          AD      ONE               INCREMENT DSPCOUNT
 1883   REF   1             04,3411  0 3370 0          TC      SWSGN    +1
 1884   REF   9 LAST 338    04,3412  3 5175 1          CAF     R1D1              -0,       DSPCOUNT = 3
 1885   REF  51 LAST 338    04,3413  54 264 0          TS      DSPCOUNT
 1886   REF   3 LAST 308    04,3414  0 2476 0          TC      5BLANK            BLANKS R1
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L        PINBALL GAME  BUTTONS AND LIGHTS                                          USER'S OWN PAGE NO.  51

 1887    REF  10 LAST 336      04,3415  0 0122 0                TC       ENTEXIT

 1888                          04,3416   00000 1  SWTAB         OCT      0                           -R3
 1889                          04,3417   00001 0                OCT      1                           +R3
 1890                          04,3420   00003 1                OCT      3                           -R2
 1891                          04,3421   00004 0                OCT      4                           +R2
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4553

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P1892    NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
R1893    USED TO DO ANY THING THE KEYBOARD CAN CALL. PLACE  ...VVVVVVNNNNNN
R1894    INTO A.      V-S ARE 6 BIT VERB CODE. N-S , 6 BIT NOUN CODE.

R1895    NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
R1896    MPAC+2 BEFORE THE STANDARD NVSUB CALL.

R1897     NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
R1898    SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
R1899    IF V:S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
R1900    ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
R1901    FURTHER ACTION).

R1902    IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
R1903    SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
R1904    IT DOES TC ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
R1905    ALARM CONDITION BEFORE RETURN TO CALLER.

R1906    THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
R1907    KEY, EXCEPT ERROR LIGHT RESET. ALSO BY ENDIDLE.
R1908          IT IS RELEASED BY SPECIAL VERB = RELEASE DISPLAY, ALL GO TO VERBS,
R1909    PROCEED WITHOUT DATA, TERMINATE, INITIALIZE EXECUTIVE,
R1910    RECALL PART OF RECALTST IF ENDIDLE WAS USED,
R1911    IN RECALTST IF NVSUB INITIATED LOAD AND ENDIDLE WAS NOT USED,
R1912    VB = REQUEST EXECUTIVE, VB = REQUEST WAITLIST,
R1913    MONITOR SET UP.

R1914    A NVSUB CALL THAT PASSES DSPLOCK ENDS OLD MONITOR.

R1915    DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
R1916    LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

R1917    NVSUB IN FIXED-FIXED PLACES 2+CALLING LOC INTO NVQTEM, TC NVSUBEND INTO
R1918    ENTRET. (THIS WILL RESTORE OLD CALLING BANK BITS)

  1919   REF   2 LAST 330                 5107                SETLOC MIDSIX  +1
  1920   REF   5 LAST 330           5107  54 107 0  NVSUB     TS     NVTEMP          IN FIXED FIXED
  1921   REF   6 LAST 329           5110  10 277 1            CCS    DSPLOCK
  1922   REF 200 LAST 336           5111   0 0002 0           TC     Q               DSP SYST BLOCKED. RET TO 1+ CALLING LOC
  1923   REF 201 LAST 340           5112   3 0002 0           CA     Q               DSP SYST AVAILABLE
  1924   REF  92 LAST 338           5113   6 7657 1           AD     ONE
  1925   REF   1                    5114  54 325 1            TS     NVQTEM          2 + CALLING LOC INTO NVQTEM
  1926   REF   2 LAST 337           5115   0 5131 1           TC     KILMONON        TURN ON KILL MONITOR BIT
  1927   REF   1                    5116   3 5122 0  NVSUBCOM CAF    NVSBBBNK

  1928   REF  19 LAST 160           5117  56 006 1            XCH    BBANK
  1929   REF   1                    5120  54 326 1            TS     NVBNKTEM
  1930   REF   1                    5121   0 2000 0           TC     NVSUBB          GO TO NVSUB1 THRU STANDARD LOC
  1931   REF  52 LAST 338                       E0            EBANK= DSPCOUNT
  1932   REF   2 LAST 303           5122    12000 1  NVSBBBNK BBCON  NVSUB1
```

```
 1933   REF 202 LAST 340         5123  3 0002 0  NVSUBMON CA      Q                MONDO COMES HERE
 1934   REF  93 LAST 340         5124  6 7657 1           AD      ONE
 1935   REF   2 LAST 340         5125  54 325 1           TS      NVQTEM           2 + CALLING LOC INTO NVQTEM
 1936   REF   1                  5126  0 5116 1           TC      NVSUBCOM


 1937   REF   3 LAST 341         5127  52 326 1  NVSUBEND DXCH    NVQTEM           NVBNKTEM MUST = NVQTEM+1
 1938   REF  11 LAST 324         5130  52 006 0           DXCH    Z                DTCB

 1939   REF   1                     05,3344               SETLOC  ENDRQWT +1

 1940   REF   1              05,3344  3 3363 1  NVSUB1   CAF     ENTSET           IN BANK
 1941   REF   7 LAST 335     05,3345  54 122 1           TS      ENTRET           SET RETURN TO NVSUBEND
 1942   REF   3 LAST 329     05,3346  3 3401 1           CAF     LOW6
 1943   REF   6 LAST 340     05,3347  7 0107 0           MASK    NVTEMP
 1944   REF 520 LAST 337     05,3350  54 140 0           TS      MPAC             TEMP STORAGE
 1945   REF   1              05,3351  3 3402 1           CAF     MID6
 1946   REF   7 LAST 341     05,3352  7 0107 0           MASK    NVTEMP
 1947   REF   5 LAST 338     05,3353  0 5200 0           TC      RIGHT5
 1948   REF  36 LAST 333     05,3354  54 020 1           TS      CYR
 1949   REF  37 LAST 341     05,3355  56 020 0           XCH     CYR
 1950   REF 521 LAST 341     05,3356  54 141 1           TS      MPAC     +1      TEMP STORAGE
 1951   REF 522 LAST 341     05,3357  10 140 0           CCS     MPAC             TEST NOUN
 1952                        05,3360  0 3364 0           TC      +4               IF NOUN NOT +0, GO ON
 1953   REF 523 LAST 341     05,3361  56 141 0           XCH     MPAC     +1
 1954   REF   7 LAST 319     05,3362  0 2314 0           TC      UPDATVB  -1      IF NOUN = +0, DISPLAY VERB . THEN RETURN
 1955   REF   2 LAST 335     05,3363  0 5127 0  ENTSET   TC      NVSUBEND
 1956   REF 524 LAST 341     05,3364  10 141 1           CCS     MPAC     +1      TEST VERB
 1957                        05,3365  0 3371 1           TC      +4               IF VERB NOT +0, GO ON
 1958   REF 525 LAST 341     05,3366  56 140 1           XCH     MPAC
 1959   REF   1              05,3367  0 2274 1           TC      UPDATNN  -1      IF VERB = +0, DISPLAY NOUN. THEN RETURN
 1960   REF   3 LAST 341     05,3370  0 5127 0           TC      NVSUBEND
 1961   REF 526 LAST 341     05,3371  56 141 0           XCH     MPAC     +1
 1962   REF   8 LAST 341     05,3372  0 2314 0           TC      UPDATVB  -1      IF BOTH NOUN AND VERB NOT +0, DISPLAY
 1963   REF 527 LAST 341     05,3373  56 140 1           XCH     MPAC             BOTH AND GO TO ENTPASO
 1964   REF   2 LAST 341     05,3374  0 2274 1           TC      UPDATNN  -1
 1965   REF 131 LAST 338     05,3375  3 7665 0           CAF     ZERO
 1966   REF   3 LAST 337     05,3376  54 301 1           TS      LOADSTAT         SET FOR WAITING FOR DATA CONDITION
 1967   REF  12 LAST 320     05,3377  54 302 1           TS      CLPASS
 1968   REF   3 LAST 303     05,3400  0 2031 1           TC      ENTPASO

R1969   IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
R1970   NOUNCADR IN ENTPASO (INTMCTBS ).


 1971                        05,3401   00077 1  LOW6     OCT     77
 1972                        05,3402   07700 1  MID6     OCT     7700
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L        PINBALL GAME  BUTTONS AND LIGHTS                                                   USER'S OWN PAGE NO.  54

 1973    REF   4 LAST 341                5131             SETLOC NVSUBEND +2
 1974    REF  27 LAST 330         5131  4 7641 1  KILMONON CS      BIT15          FORCE BIT 15 OF MONSAVE1 TO 1.
 1975                             5132  0 0004 0           INHINT                           THIS IS THE KILL MONITOR BIT.
 1976    REF   6 LAST 330         5133  7 0306 0           MASK    MONSAVE1
 1977    REF  28 LAST 342         5134  6 7641 0           AD      BIT15
 1978    REF   7 LAST 342         5135  54 306 0           TS      MONSAVE1
 1979                             5136  0 0003 1           RELINT
 1980    REF 203 LAST 341         5137  0 0002 0           TC      Q


R1981    LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
R1982              +1  PROCEED NO DATA. SET BY SPECIAL VERB
R1983             -1 TERMINATE   SET BY SPECIAL VERB
R1984             -0 DATA IN   SET BY END OF LOAD ROUTINE


R1985    L  TC ENDIDLE  (FIXED FIXED)
R1986    ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
R1987    WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
R1988    ENDIDLE CANNOT BE CALLED FROM ERASABLE MEMORY, SINCE JOBSLEEP AND
R1989    JOBWAKE CAN HANDLE ONLY FIXED MEMORY.
R1990    RECALTST TESTS LOADSTAT AND WAKES JOB UP TO,
R1991    L+1        FOR TERMINATE
R1992    L+2        FOR PROCEED WITHOUT DATA
R1993    L+3        FOR DATA IN
R1994    IT DOES NOTHING     IF LOADSTAT INDICATES WAITING FOR DATA.

 1995    REF  94 LAST 341         5140  3 7657 1  ENDIDLE  CAF     ONE
 1996    REF   7 LAST 340         5141  54 277 1           TS      DSPLOCK
 1997    REF  35 LAST 137         5142  22 004 0           LXCH    FBANK
 1998    REF 204 LAST 342         5143  56 002 0           XCH     Q
 1999    REF  23 LAST 257         5144  52 120 0           DXCH    BUF2
 2000    REF   3 LAST 277         5145  0 4112 1           TC      MAKECADR
 2001    REF   5 LAST 308         5146  54 323 1           TS      CADRSTOR
 2002    REF   3 LAST 207         5147  0 4416 0           TC      JOBSLEEP


 2003    REF  43 LAST 337         5150  0 4440 0  ENDINST  TC      ENDOFJOB

R2004    DATAWAIT IS AN ALTERNATIVE TO ENDIDLE. IT RETURNS IMMEDIATELY IF
R2005    LOADSTAT INDICATES THAT DATA IS ALREADY IN, OR PROCEED OR TERMINATE HAS
R2006    BEEN EXECUTED. RETURN FORMAT IS SAME AS FOR ENDIDLE.
R2007    DATAWAIT CANNOT BE CALLED FROM ERASABLE MEMORY, SINCE JOBSLEEP
R2008    AND JOBWAKE CAN HANDLE ONLY FIXED MEMORY.
R2009    DATAWAIT SHOULD BE USED ONLY AFTER REQUESTING A LOAD VERB.

 2010    REF   4 LAST 341         5151  10 301 1  DATAWAIT CCS     LOADSTAT
 2011   REF   1                5152  1 5157 0            TCF     DATWAIT1     PROCEED. RETURN TO L+2.
 2012   REF  17 LAST 278       5153  1 5140 0            TCF     ENDIDLE      STILL WAITING. GO TO SLEEP.
 2013   REF 205 LAST 342       5154  0 0002 0            TC      Q            TERMINATE. RETURN TO L+1.
 2014   REF 206 LAST 343       5155  50 002 0            INDEX   Q            DATA IN. RETURN TO L+3.
 2015                          5156  0 0002 0            TC      2
 2016   REF 207 LAST 343       5157  50 002 0  DATWAIT1  INDEX   Q            RETURN TO L+2.
 2017                          5160  0 0001 0            TC      1

R2018   DATAWAIT DOES NOT RELEASE DISPLAY SYST. IT IS RELEASED AT END OF NVSUB
R2019   INITIATED LOAD, IF ENDIDLE WAS NOT USED.


 2020   REF   2 LAST 341              05,3403            SETLOC MID6  +1
R2021   DSPMM  PLACE MAJOR MODE CODE INTO MODREG

 2022   REF   1             05,3403  3 5241 0  DSPMM1    CAF     MD1          GETS HERE THRU DSPMM (STANDARD LEAD IN)
 2023   REF  53 LAST 340    05,3404  56 264 1            XCH     DSPCOUNT
 2024   REF   1             05,3405  54 124 1            TS      DSPMMTEM     SAVE DSPCOUNT
 2025   REF   6 LAST 267    05,3406  3 0276 1            CA      MODREG
 2026   REF 208 LAST 343    05,3407  22 002 0            LXCH    Q
 2027   REF   3 LAST 335    05,3410  0 3255 0            TC      DSP2BIT
 2028   REF   2 LAST 343    05,3411  56 124 0            XCH     DSPMMTEM     RESTORE DSPCOUNT
 2029   REF  54 LAST 343    05,3412  54 264 0            TS      DSPCOUNT
 2030   REF  80 LAST 322    05,3413  0 0001 0  DSPMMEND  TC      L


R2031   RECALTST IS ENTERED DIRECTLY AFTER DATA IS
R2032   LOADED, TERMINATE VERB IS EXECUTED, OR THE PROCEED WITHOUT DATA VERB IS
R2033   EXECUTED. IT WAKES UP JOB THAT DID TC ENDIDLE.

R2034   IF NVSUB INITIATED LOAD, AND ENDIDLE WAS NOT USED, THEN IT RELEASES
R2035   DISPLAY SYST. (NEEDED FOR DATAWAIT)

 2036   REF   4 LAST 338              04,3422            SETLOC SWTAB  +4

 2037   REF   6 LAST 342    04,3422  10 323 1  RECALTST  CCS     CADRSTOR
 2038   REF   1             04,3423  0 3430 0            TC      RECAL1
 2039   REF  44 LAST 342    04,3424  0 4440 0            TC      ENDOFJOB     NORMAL EXIT IF KEYBOARD INITIATED
 2040   REF   2 LAST 343    04,3425  0 3430 0            TC      RECAL1
 2041   REF   7 LAST 343    04,3426  54 323 1            TS      CADRSTOR     -0. CONCLUSION OF NVSUB INITIATED LOAD.
 2042   REF   1             04,3427  0 3446 1            TC      RECAL3       +0 INTO CADRSTOR, RELEASE DISPLAY,
A2043                                                                            AND ENDOFJOB. NEEDED FOR DATAWAIT.
 2044   REF 132 LAST 341    04,3430  3 7665 0  RECAL1    CAF     ZERO
 2045   REF   8 LAST 343    04,3431  56 323 0            XCH     CADRSTOR
 2046                       04,3432  0 0004 0            INHINT
 2047   REF   3 LAST 206    04,3433  0 4422 1            TC      JOBWAKE
 2048   REF   5 LAST 342    04,3434  10 301 1            CCS     LOADSTAT
 2049   REF   1             04,3435  0 3452 1            TC      DOPROC       + PROCEED WITHOUT DATA
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                     USER'S OWN PAGE NO.  56

 2050   REF  45 LAST 343     04,3436  0 4440 0            TC      ENDOFJOB        PATHALOGICAL CASE EXIT
 2051   REF   1              04,3437  0 3450 0            TC      DOTERM          -   TERMINATE
 2052   REF  45 LAST 334     04,3440  3 7656 0            CAF     TWO
 2053   REF  24 LAST 285     04,3441  50 071 1  RECAL2    INDEX   LOCCTR
 2054   REF  44 LAST 225     04,3442  6 0150 0            AD      LOC             LOC IS + FOR BASIC JOBS
 2055   REF  25 LAST 344     04,3443  50 071 1            INDEX   LOCCTR
 2056   REF  45 LAST 344     04,3444  54 150 1            TS      LOC
 2057                        04,3445  0 0003 1            RELINT
 2058   REF   2 LAST 328     04,3446  0 5364 0  RECAL3    TC      RELDSP1         DOES NOT SEARCH LIST
 2059   REF  46 LAST 344     04,3447  0 4440 0            TC      ENDOFJOB

 2060   REF 133 LAST 343     04,3450  3 7665 0  DOTERM    CAF     ZERO
 2061   REF   1              04,3451  0 3441 0            TC      RECAL2

 2062   REF  95 LAST 342     04,3452  3 7657 1  DOPROC    CAF     ONE
 2063   REF   2 LAST 344     04,3453  0 3441 0            TC      RECAL2
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L       PINBALL GAME  BUTTONS AND LIGHTS                                                  USER'S OWN PAGE NO.  57

P2064   THE FOLLOWING REFERS TO THE NOUN TABLES


R2065   COMPONENT CODE NUMBER            INTERPRETATION

R2066   00000                            1 COMPONENT
R2067   00001                            2 COMPONENT  (EACH S P)
R2068   00010                            3 COMPONENT  (EACH SP)


R2069   SF ROUTINE CODE NUMBER           INTERPRETATION

R2070   00000    OCTAL ONLY
R2071   00001    STRAIGHT FRACTIONAL
R2072   00010    DEGREES (XXX.XX)
R2073   00011    ARITHMETIC SF
R2074   00100    ARITH DP1   OUT(MULT BY 2/14 AT END)       IN(STRAIGHT)
R2075   00101    ARITH DP2   OUT(STRAIGHT)                  IN(SL 7 AT END)
R2076   00110    OPTICS DEGREES(XX.XXX MAX 89.999) OR (XXX.XX MAX 179.99)
R2077   00111    ARITH DP3   OUT ( SL 7 AT END)        IN ( STRAIGHT)
R2078   END OF SF ROUTINE CODE NUMBERS


R2079   SF CONSTANT CODE NUMBER          INTERPRETATION

R2080   00000                            WHOLE
R2081   00000                            TIME SEC(XXX.XX)SAME AS WHOLE(ARITH DP1)
R2082   00001                            TIME HOURS(XXX.XX) USE ARITH DP2
R2083   00010                            DEGREES
R2084   00010                            OPTICS DEGREES
R2085   00011                            GYRO DEGREES (XX.XXX)  USE ARITHDP3
R2086   00100                            GYRO BIAS DRIFT .BBXXXXX MILLIRAD/SEC
R2087   00101                            GYRO AXIS ACCEL. DRIFT
R2088                                    .BBXXXXX (MILLIRAD/SEC) / (CM/SEC SEC)
R2089   00110                            PIPA BIAS X.XXXX CM/SEC SEC
R2090   00111                            PIPA SCALE FACTOR ERROR
R2091                                        XXXXX. PARTS/MILLION
R2092   01000                            POSITION(XXXX.X KILOMETERS) USE ARITHDP3
R2093   01001                            VELOCITY(XXXX.X METERS/SEC) USE ARITHDP2
R2094   01010                            TIME HOURS(XXX.XX)WEEKS INSIDE(ARITHDP2)
R2095   01011                            ELEVATION DEGREES(89.999MAX) USE ARITH
R2096   01100                            RENDEZVOUS RADAR RANGE(XXXXXB.FEET)
R2097                                                                  USE ARITHDP1
R2098   01101                            RENDEZVOUS RADAR RANGE RATE(XXXXX.FT/SEC
R2099                                                                  USE ARITHDP1
R2100   01110                            LANDING RADAR ALTITUDE(XXXXX.FEET)
R2101                                                                  USE ARITHDP1
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R2102   01111                           INITIAL/FINAL ALTITUDE(XXXXX.FEET)
R2103                                                               USE ARITHDP1
R2104   10000                           ALTITUDE RATE(XXXXX.FEET)      USE ARITH
R2105   10001                           FORWARD/LATERAL VELOCITY(XXXXX.FEET/SEC)
R2106                                                                  USE ARITH
R2107   10010                           ROTATIONAL HAND CONTROLLER ANGLE RATES
R2108                                         XXXXX.DEG/SEC            USE ARITH
R2109   10011                           LANDING RADAR VELX(XXXXX.FEET/SEC)
R2110                                                               USE ARITHDP1
R2111   10100                           LANDING RADAR VELY(XXXXX.FEET/SEC)
R2112                                                               USE ARITHDP1
R2113   10101                           LANDING RADAR VELZ(XXXXX.FEET/SEC)
R2114                                                               USE ARITHDP1
R2115   10110                           OPTICAL TRACKER AZIMUTH ANGLE(XXX.XXDEG)
R2116                                                               USE ARITHDP1
R2117   END OF SF CONSTANT CODE NUMBERS


R2118   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R2119   NOUN TABLES.
R2120   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R2121   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R2122   TO GET AT BOTH MAJOR AND MINOR PARTS (IN OCTAL), USE NOUN 01.
```

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P2123  THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R2124  (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R2125  ROUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.


R2126  LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R2127  NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDAD1TEM IS LOADED WITH THE FIRST
R2128  IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R2129  IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R2130  MIXED OR NORMAL NOUN.

 2131                          16,2000             BANK     16

 2132  REF    1       16,2000  52 136 1  LODNNTAB DXCH     IDAD2TEM         SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
 2133  REF   10 LAST 336   16,2001  50 267 1           INDEX    NOUNREG
 2134  REF    1            16,2002  3 2052 1           CAF      NNADTAB
 2135  REF    7 LAST 323   16,2003  54 132 0           TS       NNADTEM
 2136  REF   11 LAST 347   16,2004  50 267 1           INDEX    NOUNREG
 2137  REF    1            16,2005  3 2152 0           CAF      NNTYPTAB
 2138  REF    5 LAST 322   16,2006  54 133 1           TS       NNTYPTEM
 2139  REF   12 LAST 347   16,2007  4 0267 0           CS       NOUNREG
 2140  REF    1            16,2010  6 2036 0           AD       MIXCON
 2141                      16,2011  0 0006 1           EXTEND
 2142  REF    1            16,2012  6 2016 1           BZMF     LODMIXNN         NOUN NUMBER G/E FIRST MIXED NOUN
 2143  REF   96 LAST 344   16,2013  3 7657 1           CAF      ONE              NOUN NUMBER L/ FIRST MIXED NOUN
 2144  REF   12 LAST 326   16,2014  54 124 1           TS       MIXBR            NORMAL.  +1 INTO MIXBR.
 2145  REF    1            16,2015  0 2034 1           TC       LODNLV
 2146  REF   46 LAST 344   16,2016  3 7656 0  LODMIXNN CAF      TWO              MIXED.  +2 INTO MIXBR.
 2147  REF   13 LAST 347   16,2017  54 124 1           TS       MIXBR
 2148  REF   13 LAST 347   16,2020  50 267 1           INDEX    NOUNREG
 2149  REF    1            16,2021  3 2420 0           CAF      RUTMXTAB -55
 2150  REF    2 LAST 321   16,2022  54 137 0           TS       RUTMXTEM
 2151  REF   15 LAST  55   16,2023  3 6426 1           CAF      LOW10
 2152  REF    8 LAST 347   16,2024  7 0132 0           MASK     NNADTEM
 2153  REF  209 LAST 343   16,2025  54 002 1           TS       Q                TEMP
 2154  REF  228 LAST 338   16,2026  50 000 1           INDEX    A
 2155  REF    1            16,2027  3 2406 1           CAF      IDADDTAB
 2156  REF    4 LAST 322   16,2030  54 134 0           TS       IDAD1TEM         LOAD IDAD1TEM WITH FIRST IDADDTAB ENTRY
 2157                      16,2031  0 0006 1           EXTEND
 2158  REF  210 LAST 347   16,2032  5 0002 0           INDEX    Q                LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
 2159  REF    2 LAST 347   16,2033  3 2410 0           DCA      IDADDTAB +1      LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY.
 2160  REF    2 LAST 347   16,2034  52 136 1  LODNLV   DXCH     IDAD2TEM         PUT RETURN INFO INTO A, L.
 2161  REF   12 LAST 341   16,2035  52 006 0           DXCH     Z

 2162                      16,2036   00055 1  MIXCON   OCT      55               FIRST MIXED NOUN = 55.


R2163  GTSFOUT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOUTAB ENTRIES.
```

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L        PINBALL GAME  BUTTONS AND LIGHTS                                                  USER'S OWN PAGE NO.  60

 2164    REF  14 LAST 326        16,2037  52 110 0  GTSFOUT  DXCH    SFTEMP1              2X(SFCONUM) ARRIVES IN SFTEMP1.
 2165                            16,2040  0 0006 1           EXTEND
 2166    REF 229 LAST 347        16,2041  5 0000 1           INDEX   A
 2167    REF   1                 16,2042  3 2331 1           DCA     SFOUTAB
 2168    REF  15 LAST 348        16,2043  52 110 0  SFCOM    DXCH    SFTEMP1
 2169    REF  13 LAST 347        16,2044  52 006 0           DXCH    Z


R2170    GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

 2171    REF  16 LAST 348        16,2045  52 110 0  GTSFIN   DXCH    SFTEMP1              2X(SFCONUM) ARRIVES IN SFTEMP1.
 2172                            16,2046  0 0006 1           EXTEND
 2173    REF 230 LAST 348        16,2047  5 0000 1           INDEX   A
 2174    REF   1                 16,2050  3 2253 1           DCA     SFINTAB
 2175    REF   1                 16,2051  1 2043 0           TCF     SFCOM



A2176                                                                                 NN  NORMAL NOUNS
 2177                            16,2052   00000 1  NNADTAB  OCT     00000            00 NOT IN USE
 2178                            16,2053   40000 0           OCT     40000            01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
 2179                            16,2054   40000 0           OCT     40000            02 SPECIFY MACHINE ADDRESS (WHOLE)
 2180                            16,2055   40000 0           OCT     40000            03 SPECIFY MACHINE ADDRESS (DEGREES)
 2181                            16,2056   40000 0           OCT     40000            04 SPECIFY MACHINE ADDRESS (HOURS)
 2182                            16,2057   40000 0           OCT     40000            05 SPECIFY MACHINE ADDRESS (SECONDS)
 2183                            16,2060   40000 0           OCT     40000            06 SPECIFY MACHINE ADDRESS (GYRO DEG)
 2184                            16,2061   00000 1           OCT     00000            07 SPARE
 2185                            16,2062   77776 1           OCT     77776            10 CHANNEL TO BE SPECIFIED
 2186                            16,2063   00000 1           OCT     00000            11 SPARE
 2187                            16,2064   00000 1           OCT     00000            12 SPARE
 2188                            16,2065   00000 1           OCT     00000            13 SPARE
 2189                            16,2066   00000 1           OCT     00000            14 SPARE
 2190                            16,2067   77777 0           OCT     77777            15 INCREMENT MACHINE ADDRESS
 2191    REF   7 LAST 283        16,2070   00024 1           ECADR   TIME2            16 TIME SECONDS
 2192    REF   8 LAST 348        16,2071   00024 1           ECADR   TIME2            17 TIME HOURS
 2193    REF   9 LAST 280        16,2072   00032 0           ECADR   CDUX             20 ICDU
 2194    REF   2 LAST 197        16,2073   00037 0           ECADR   PIPAX            21 PIPAS
 2195    REF   5 LAST 273        16,2074   00400 0           ECADR   THETAD           22 NEW ANGLES I
 2196    REF   4 LAST 262        16,2075   00336 1           ECADR   DSPTEM2          23 DELTA ANGLES I
 2197    REF   8 LAST 337        16,2076   00333 1           ECADR   DSPTEM1          24 DELTA TIME (SEC)
 2198    REF   9 LAST 348        16,2077   00333 1           ECADR   DSPTEM1          25 CHECKLIST
 2199    REF  10 LAST 348        16,2100   00333 1           ECADR   DSPTEM1          26 PRIO/DELAY, ADRES, BBCON
 2200    REF   2 LAST 151        16,2101   01361 1           ECADR   SMODE            27 SELF TEST ON/OFF SWITCH
 2201    REF  11 LAST 348        16,2102   00333 1           ECADR   DSPTEM1          30 STAR NUMBERS
 2202    REF   3 LAST 300        16,2103   01363 0           ECADR   FAILREG          31 FAILREG
 2203    REF   1                 16,2104   02166 1           ECADR   TDEC             32 DECISION TIME (MIDCOURSE)
 2204    REF   1                 16,2105   02046 1           ECADR   TET              33 EPHEMERIS TIME (MIDCOURSE)
 2205    REF   1                 16,2106   02174 1           ECADR   MEASQ            34 MEASURED QUANTITY (MIDCOURSE)
 2206    REF  12 LAST 348        16,2107   00333 1           ECADR   DSPTEM1          35 INBIT MESSAGE
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  2207    REF   1              16,2110   01474 1            ECADR  LANDMARK       36 LANDMARK DATA 1
  2208    REF   2 LAST 349     16,2111   01477 1            ECADR  LANDMARK +3    37 LANDMARK DATA 2
  2209    REF   8 LAST 250     16,2112   00035 1            ECADR  OPTY           40 RENDEZVOUS RADAR ANGLES (TRUN, SHAFT)
  2210    REF  15 LAST 244     16,2113   00423 1            ECADR  TANG           41 NEW REND. RADAR ANGLES (TRUN, SHAFT)
  2211    REF   5 LAST 348     16,2114   00336 1            ECADR  DSPTEM2        42 AOT ROTATION ANGLES
  2212    REF   8 LAST 226     16,2115   00375 0            ECADR  XYMARK         43 AOT DETENT CODE
  2213    REF   3 LAST 166     16,2116   00360 1            ECADR  FORVEL         44 FORWARD VELOCITY, LATERAL VELOCITY
  2214    REF   2 LAST 275     16,2117   03035 1            ECADR  PCOM           45 ROTATIONAL HAND CONTROLLER ANGLE RATE
  2215                         16,2120   00000 1            OCT    00000          46 SPARE
  2216                         16,2121   00000 1            OCT    00000          47 SPARE
  2217                         16,2122   00000 1            OCT    00000          50 SPARE
  2218                         16,2123   00000 1            OCT    00000          51 SPARE
  2219    REF   1              16,2124   01440 0            ECADR  GBIASX         52 GYRO BIAS DRIFT
  2220    REF   2 LAST 212     16,2125   01443 0            ECADR  ADIAX          53 GYRO INPUT AXIS ACCELERATION DRIFT
  2221    REF   2 LAST 212     16,2126   01446 0            ECADR  ADSRAX         54 GYRO SPIN AXIS ACCELERATION DRIFT

A2222                                                                             NN  MIXED NOUNS
  2223                         16,2127   02000 0            OCT    02000          55 LANDING RADAR ALTITUDE, TIME(SEC)
  2224                         16,2130   02002 1            OCT    02002          56 LANDING RADAR VELX, TIME(SEC)
  2225                         16,2131   02004 1            OCT    02004          57 LANDING RADAR VELY, TIME(SEC)
  2226                         16,2132   02006 0            OCT    02006          60 LANDING RADAR VELZ, TIME(SEC)
  2227                         16,2133   02010 1            OCT    02010          61 TARGET AZIMUTH AND ELEVATION
  2228                         16,2134   04012 0            OCT    04012          62 RENDEZVOUS RADAR RANGE, TRUN, SHAFT
  2229                         16,2135   04015 1            OCT    04015          63 REND. RADAR RANGE RATE, TRUN, SHAFT
  2230                         16,2136   04020 1            OCT    04020          64 INITIAL ALT, FINAL ALT, ALT RATE
  2231                         16,2137   02023 1            OCT    02023          65 SAMPLED TIME (HOURS AND SECONDS)
A2232                                                                                (FETCHED IN INTERRUPT)
  2233                         16,2140   04025 1            OCT    04025          66 SYSTEM TEST RESULTS
  2234                         16,2141   04030 0            OCT    04030          67 DELTA GYRO ANGLES
  2235                         16,2142   02033 0            OCT    02033          70 OPTICAL TRACKER ANGLES (AZIMUTH,ELEV)
  2236                         16,2143   02035 0            OCT    02035          71 DESIRED OPT. TRACK. ANGLES (AZ, ELEV)
  2237                         16,2144   04037 1            OCT    04037          72 DELTA POSITION
  2238                         16,2145   04042 0            OCT    04042          73 DELTA VELOCITY
  2239                         16,2146   04045 1            OCT    04045          74 MEASUREMENT DATA (MIDCOURSE)
  2240                         16,2147   04050 0            OCT    04050          75 MEASUREMENT DEVIATIONS (MIDCOURSE)
  2241                         16,2150   04053 0            OCT    04053          76 POSITION VECTOR
  2242                         16,2151   04056 0            OCT    04056          77 VELOCITY VECTOR


A2243                                                                             NN         NORMAL NOUNS
  2244                         16,2152   00000 1  NNTYPTAB  OCT    00000          00 NOT IN USE
  2245                         16,2153   00040 0            OCT    00040          01 1COMP   FRACTIONAL
  2246                         16,2154   00140 1            OCT    00140          02 1COMP   WHOLE
  2247                         16,2155   00102 1            OCT    00102          03 1COMP   DEGREES
  2248                         16,2156   00241 0            OCT    00241          04 1COMP   HOURS
  2249                         16,2157   00200 0            OCT    00200          05 1COMP   SECONDS
  2250                         16,2160   00343 0            OCT    00343          06 1COMP   GYRO DEGREES
  2251                         16,2161   00000 1            OCT    00000          07         SPARE
  2252                         16,2162   00000 1            OCT    00000          10 1COMP   OCTAL ONLY
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 2253                       16,2163   00000 1       OCT       00000          11         SPARE
 2254                       16,2164   00000 1       OCT       00000          12         SPARE
 2255                       16,2165   00000 1       OCT       00000          13         SPARE
 2256                       16,2166   00000 1       OCT       00000          14         SPARE
 2257                       16,2167   00000 1       OCT       00000          15 1COMP   OCTAL ONLY
 2258                       16,2170   00200 0       OCT       00200          16 1COMP   SECONDS
 2259                       16,2171   00241 0       OCT       00241          17 1COMP   HOURS
 2260                       16,2172   04102 0       OCT       04102          20 3COMP   DEGREES
 2261                       16,2173   04140 0       OCT       04140          21 3COMP   WHOLE
 2262                       16,2174   04102 0       OCT       04102          22 3COMP   DEGREES
 2263                       16,2175   04102 0       OCT       04102          23 3COMP   DEGREES
 2264                       16,2176   00200 0       OCT       00200          24 1COMP   SECONDS
 2265                       16,2177   00140 1       OCT       00140          25 1COMP   WHOLE
 2266                       16,2200   04000 0       OCT       04000          26 3COMP   OCTAL ONLY
 2267                       16,2201   00140 1       OCT       00140          27 1COMP   WHOLE
 2268                       16,2202   04140 0       OCT       04140          30 3COMP   WHOLE
 2269                       16,2203   04000 0       OCT       04000          31 3COMP   OCTAL ONLY
 2270                       16,2204   00252 1       OCT       00252          32 1COMP   TIME WEEKS
 2271                       16,2205   00252 1       OCT       00252          33 1COMP   TIME WEEKS
 2272                       16,2206   00350 1       OCT       00350          34 1COMP   POSITION
 2273                       16,2207   04000 0       OCT       04000          35 3COMP   OCTAL ONLY
 2274                       16,2210   04000 0       OCT       04000          36 3COMP   OCTAL ONLY
 2275                       16,2211   04000 0       OCT       04000          37 3COMP   OCTAL ONLY
 2276                       16,2212   02102 0       OCT       02102          40 2COMP   DEGREES
 2277                       16,2213   02102 0       OCT       02102          41 2COMP   DEGREES
 2278                       16,2214   02102 0       OCT       02102          42 2COMP   DEGREES
 2279                       16,2215   00140 1       OCT       00140          43 1COMP   WHOLE
 2280                       16,2216   02161 0       OCT       02161          44 2COMP   FORWARD/LATERAL VELOCITY
 2281                       16,2217   04162 0       OCT       04162          45 3COMP   ROT HAND CONT ANGLE RATE
 2282                       16,2220   00000 1       OCT       00000          46         SPARE
 2283                       16,2221   00000 1       OCT       00000          47         SPARE
 2284                       16,2222   00000 1       OCT       00000          50         SPARE
 2285                       16,2223   00000 1       OCT       00000          51         SPARE
 2286                       16,2224   04144 1       OCT       04144          52 3COMP   GYRO BIAS DRIFT
 2287                       16,2225   04145 0       OCT       04145          53 3COMP   GYRO AXIS ACCEL. DRIFT
 2288                       16,2226   04145 0       OCT       04145          54 3COMP   GYRO AXIS ACCEL. DRIFT

A2289                                                                        NN         MIXED NOUNS
 2290                       16,2227   00016 0       OCT       00016          55 2COMP   LANDING RADAR ALT, SECONDS
 2291                       16,2230   00023 0       OCT       00023          56 2COMP   LANDING RADAR VELX, SECONDS
 2292                       16,2231   00024 1       OCT       00024          57 2COMP   LANDING RADAR VELY, SECONDS
 2293                       16,2232   00025 0       OCT       00025          60 2COMP   LANDING RADAR VELZ, SECONDS
 2294                       16,2233   00542 1       OCT       00542          61 2COMP   DEGREES, ELEVATION DEGREES
 2295                       16,2234   04114 1       OCT       04114          62 3COMP   REND. RADAR RANGE, DEG, DEG
 2296                       16,2235   04115 0       OCT       04115          63 3COMP   REND. RAD. RANGE RATE, DEG,DEG
 2297                       16,2236   40757 0       OCT       40757          64 3COMP   IN/FN ALT, IN/FN ALT, ALT RATE
 2298                       16,2237   00001 0       OCT       00001          65 2COMP   HOURS, SECONDS
 2299                       16,2240   00000 1       OCT       00000          66 3COMP   WHOLE, FRACTIONAL, WHOLE
 2300                       16,2241   06143 1       OCT       06143          67 3COMP   GYRO DEGREES FOR EACH
 2301                       16,2242   00126 1       OCT       00126          70 2COMP   OPT TRACK AZIMUTH, DEGREES
 2302                16,2243  00126 1          OCT     00126       71 2COMP  OPT TRACK AZIMUTH, DEGREES
 2303                16,2244  20410 0          OCT     20410       72 3COMP  POSITION FOR EACH
 2304                16,2245  22451 1          OCT     22451       73 3COMP  VELOCITY FOR EACH
 2305                16,2246  00412 0          OCT     00412       74 3COMP  TIME WEEKS, POSITION, WHOLE
 2306                16,2247  20450 1          OCT     20450       75 3COMP  POSITION, VELOCITY, POSITION
 2307                16,2250  20410 0          OCT     20410       76 3COMP  POSITION FOR EACH
 2308                16,2251  22451 1          OCT     22451       77 3COMP  VELOCITY FOR EACH


 2309                16,2252  00006 1 SFINTAB  OCT     00006       WHOLE,TIME(SEC)
 2310                16,2253  03240 1          OCT     03240
 2311                16,2254  00253 0          OCT     00253       TIME HOURS ( = 1.3..... )
 2312                16,2255  25124 1          OCT     25124         (POINT BETWEEN BITS 7-8 )
 2313                16,2256  00000 1          OCT     0           DEGREES (SFCON IN DEGINSF )
 2314                16,2257  00000 1          OCT     0
 2315                16,2260  10707 0          OCT     10707       GYRO DEGREES
 2316                16,2261  03435 0          OCT     03435                 UPPED BY 1
 2317                16,2262  00001 0          OCT     00001       GYRO BIAS DRIFT
 2318                16,2263  02133 1          OCT     02133
 2319                16,2264  00011 1          OCT     00011       GYRO AXIS ACCEL. DRIFT
 2320                16,2265  30322 1          OCT     30322
 2321                16,2266  00004 0          OCT     00004       PIPA BIAS
 2322                16,2267  14021 1          OCT     14021
 2323                16,2270  00314 1          OCT     00314       PIPA SCALE ERROR.
 2324                16,2271  31463 1          OCT     31463
 2325                16,2272  23420 0          OCT     23420       POSITION
 2326                16,2273  00000 1          OCT     00000
 2327                16,2274  00201 1          OCT     00201       VELOCITY
 2328                16,2275  30327 1          OCT     30327       ( POINT BETWEEN BITS 7-8 )
 2329                16,2276  01371 0          OCT     01371       TIME WEEKS
 2330                16,2277  34750 1          OCT     34750       ( POINT BETWEEN BITS 7-8 )
 2331                16,2300  00001 0          OCT     00001       ELEVATION DEGREES
 2332                16,2301  03434 1          OCT     03434
 2333                16,2302  00006 1          OCT     00006       RENDEZVOUS RADAR RANGE
 2334                16,2303  20162 0          OCT     20162
 2335                16,2304  00011 1          OCT     00011       RENDEZVOUS RADAR RANGE RATE
 2336                16,2305  27066 1          OCT     27066
 2337                16,2306  00016 0          OCT     00016       LANDING RADAR ALTITUDE
 2338                16,2307  04245 0          OCT     04245
 2339                16,2310  00002 0          OCT     00002       INITIAL/FINAL ALTITUDE
 2340                16,2311  23224 1          OCT     23224
 2341                16,2312  00014 1          OCT     00014       ALTITUDE RATE
 2342                16,2313  06500 1          OCT     06500
 2343                16,2314  00012 1          OCT     00012       FORWARD/LATERAL VELOCITY
 2344                16,2315  36455 0          OCT     36455
 2345                16,2316  04256 1          OCT     04256       ROT HAND CONT ANGLE RATE
 2346                16,2317  07071 0          OCT     07071
 2347                16,2320  77766 0          OCT     77766       LANDING RADAR VELX (NEG TO SWITCH SIGNS)
 2348                16,2321  60044 1          OCT     60044
 2349                    16,2322   00004 0            OCT     00004          LANDING RADAR VELY
 2350                    16,2323   34055 0            OCT     34055
 2351                    16,2324   00007 0            OCT     00007          LANDING RADAR VELZ
 2352                    16,2325   04147 1            OCT     04147
 2353                    16,2326   00005 1            OCT     00005          OPTICAL AZIMUTH TRACKER ANGLE
 2354                    16,2327   21616 0            OCT     21616
A2355                                                                        END OF SFINTAB


 2356                    16,2330   05174 0  SFOUTAB   OCT     05174          WHOLE, TIME(SEC)
 2357                    16,2331   13261 0            OCT     13261
 2358                    16,2332   27670 0            OCT     27670          TIME HOURS
 2359                    16,2333   31357 1            OCT     31357
 2360                    16,2334   00000 1            OCT     0              DEGREES
 2361                    16,2335   00000 1            OCT     0
 2362                    16,2336   00714 0            OCT     00714          GYRO DEGREES
 2363                    16,2337   31463 1            OCT     31463          (POINT BETWEEN BITS 7-8)
 2364                    16,2340   35753 0            OCT     35753          GYRO BIAS DRIFT
 2365                    16,2341   32323 1            OCT     32323
 2366                    16,2342   03216 1            OCT     03216          GYRO AXIS ACCEL. DRIFT
 2367                    16,2343   06400 0            OCT     06400
 2368                    16,2344   07237 0            OCT     07237          PIPA BIAS
 2369                    16,2345   37776 0            OCT     37776
 2370                    16,2346   00120 1            OCT     00120          PIPA SCALE ERROR
 2371                    16,2347   00000 1            OCT     00000
 2372                    16,2350   00321 1            OCT     00321          POSITION
 2373                    16,2351   26706 1            OCT     26706          ( POINT BETWEEN BITS 7-8 )
 2374                    16,2352   37441 1            OCT     37441          VELOCITY
 2375                    16,2353   14247 0            OCT     14247
 2376                    16,2354   05300 1            OCT     05300          TIME WEEKS
 2377                    16,2355   20305 0            OCT     20305
 2378                    16,2356   34631 1            OCT     34631          ELEVATION DEGREES
 2379                    16,2357   23146 0            OCT     23146
 2380                    16,2360   04725 0            OCT     04725          RENDEZVOUS RADAR RANGE
 2381                    16,2361   35454 1            OCT     35454
 2382                    16,2362   03225 1            OCT     03225          RENDEZVOUS RADAR RANGE RATE
 2383                    16,2363   07470 0            OCT     07470
 2384                    16,2364   02207 0            OCT     02207          LANDING RADAR ALTITUDE
 2385                    16,2365   03255 0            OCT     03255
 2386                    16,2366   14226 1            OCT     14226          INITIAL/FINAL ALTITUDE
 2387                    16,2367   31757 0            OCT     31757
 2388                    16,2370   02476 0            OCT     02476          ALTITUDE RATE
 2389                    16,2371   05531 0            OCT     05531
 2390                    16,2372   02727 1            OCT     02727          FORWARD/LATERAL VELOCITY
 2391                    16,2373   16415 0            OCT     16415
 2392                    16,2374   00007 0            OCT     00007          ROT HAND CONT ANGLE RATE
 2393                    16,2375   13734 0            OCT     13734
 2394                    16,2376   74502 0            OCT     74502          LANDING RADAR VELX (NEG TO SWITCH SIGNS)
 2395                    16,2377   76401 0            OCT     76401
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L         PINBALL GAME  BUTTONS AND LIGHTS                                                       USER'S OWN PAGE NO.  65

 2396                           16,2400   06436 0            OCT     06436              LANDING RADAR VELY
 2397                           16,2401   35664 0            OCT     35664
 2398                           16,2402   04371 0            OCT     04371              LANDING RADAR VELZ
 2399                           16,2403   17420 1            OCT     17420
 2400                           16,2404   05605 1            OCT     05605              OPTICAL TRACKER AZIMUTH ANGLE
 2401                           16,2405   03656 1            OCT     03656
A2402                                                                                   END OF SFOUTAB


A2403                                                                                   MIXNOUN   SF ROUT
 2404    REF    4 LAST 256      16,2406   03461 1  IDADDTAB ECADR   RSTACK    +18D      01        LANDING RADAR ALTITUDE
 2405    REF    5 LAST 353      16,2407   03465 0           ECADR   RSTACK    +22D      01        SECONDS
 2406    REF    6 LAST 353      16,2410   03437 1           ECADR   RSTACK              02        LANDING RADAR VELX
 2407    REF    7 LAST 353      16,2411   03443 1           ECADR   RSTACK    +4        02        SECONDS
 2408    REF    8 LAST 353      16,2412   03445 1           ECADR   RSTACK    +6        03        LANDING RADAR VELY
 2409    REF    9 LAST 353      16,2413   03451 1           ECADR   RSTACK    +10D      03        SECONDS
 2410    REF   10 LAST 353      16,2414   03453 0           ECADR   RSTACK    +12D      04        LANDING RADAR VELZ
 2411    REF   11 LAST 353      16,2415   03457 1           ECADR   RSTACK    +16D      04        SECONDS
 2412    REF   13 LAST 348      16,2416   00333 1           ECADR   DSPTEM1             05        DEGREES
 2413    REF   14 LAST 353      16,2417   00334 0           ECADR   DSPTEM1 +1          05        ELEVATION DEGREES
 2414    REF   12 LAST 353      16,2420   03437 1           ECADR   RSTACK              06        RENDEZVOUS RADAR RANGE
 2415    REF   13 LAST 353      16,2421   03441 0           ECADR   RSTACK    +2        06        DEGREES
 2416    REF   14 LAST 353      16,2422   03442 0           ECADR   RSTACK    +3        06        DEGREES
 2417    REF   15 LAST 353      16,2423   03445 1           ECADR   RSTACK    +6        07        RENDEZVOUS RADAR RANGE RATE
 2418    REF   16 LAST 353      16,2424   03447 0           ECADR   RSTACK    +8D       07        DEGREES
 2419    REF   17 LAST 353      16,2425   03450 0           ECADR   RSTACK    +9D       07        DEGREES
 2420    REF    6 LAST 279      16,2426   00352 0           ECADR   ALT                 10        INITIAL/FINAL ALTITUDE
 2421    REF    3 LAST 279      16,2427   00355 1           ECADR   FINALT              10        INITIAL/FINAL ALTITUDE
 2422    REF    6 LAST 279      16,2430   00354 0           ECADR   ALTRATE             10        ALTITUDE RATE
 2423    REF    1               16,2431   00013 0           ECADR   SAMPTIME            11        HOURS
 2424    REF    2 LAST 353      16,2432   00013 0           ECADR   SAMPTIME            11        SECONDS
 2425    REF    6 LAST 349      16,2433   00336 1           ECADR   DSPTEM2             12        WHOLE
 2426    REF    7 LAST 353      16,2434   00337 0           ECADR   DSPTEM2 +1          12        FRACTIONAL
 2427    REF    8 LAST 353      16,2435   00340 0           ECADR   DSPTEM2 +2          12        WHOLE
 2428    REF    7 LAST 265      16,2436   00403 0           ECADR   DELVX               13        GYRO DEGREES
 2429    REF    8 LAST 353      16,2437   00405 0           ECADR   DELVX     +2        13        GYRO DEGREES
 2430    REF    9 LAST 353      16,2440   00407 1           ECADR   DELVX     +4        13        GYRO DEGREES
 2431    REF    1               16,2441   01471 1           ECADR   AZANG               14        OPT TRACK AZIMUTH ANGLE
 2432    REF    1               16,2442   01471 1           ECADR   ELANG               14        DEGREES
 2433    REF    1               16,2443   01471 1           ECADR   DESLOTSY            15        OPT TRACK AZIMUTH ANGLE
 2434    REF    1               16,2444   01471 1           ECADR   DESLOTSX            15        DEGREES
 2435    REF    1               16,2445   02052 1           ECADR   DELR                16        POSITION
 2436    REF    2 LAST 353      16,2446   02054 1           ECADR   DELR      +2        16        POSITION
 2437    REF    3 LAST 353      16,2447   02056 0           ECADR   DELR      +4        16        POSITION
 2438    REF    1               16,2450   02060 0           ECADR   DELVEL              17        VELOCITY
 2439    REF    2 LAST 353      16,2451   02062 1           ECADR   DELVEL    +2        17        VELOCITY
 2440    REF    3 LAST 353      16,2452   02064 1           ECADR   DELVEL    +4        17        VELOCITY
 2441    REF    2 LAST 348      16,2453   02166 1           ECADR   TDEC                20        TIME WEEKS
 2442    REF    2 LAST 348      16,2454   02174 1           ECADR   MEASQ               20        POSITION
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  2443  REF   1                 16,2455   02200 1            ECADR   MEASMODE          20        WHOLE
  2444  REF  15 LAST 353        16,2456   00333 1            ECADR   DSPTEM1           21        POSITION
  2445  REF  16 LAST 354        16,2457   00335 1            ECADR   DSPTEM1 +2        21        VELOCITY
  2446  REF   1                 16,2460   02176 0            ECADR   DELTAQ            21        POSITION
  2447  REF  17 LAST 354        16,2461   00333 1            ECADR   DSPTEM1           22        POSITION
  2448  REF  18 LAST 354        16,2462   00335 1            ECADR   DSPTEM1 +2        22        POSITION
  2449  REF  19 LAST 354        16,2463   00337 0            ECADR   DSPTEM1 +4        22        POSITION
  2450  REF  20 LAST 354        16,2464   00333 1            ECADR   DSPTEM1           23        VELOCITY
  2451  REF  21 LAST 354        16,2465   00335 1            ECADR   DSPTEM1 +2        23        VELOCITY
  2452  REF  22 LAST 354        16,2466   00337 0            ECADR   DSPTEM1 +4        23        VELOCITY
  2453                          16,2467   00000 1            OCT     00000                       SPARE
  2454                          16,2470   00000 1            OCT     00000                       SPARE
  2455                          16,2471   00000 1            OCT     00000                       SPARE
  2456                          16,2472   00000 1            OCT     00000                       SPARE
  2457                          16,2473   00000 1            OCT     00000                       SPARE
  2458                          16,2474   00000 1            OCT     00000                       SPARE
 A2459                                                                                 END OF IDADDTAB


 A2460                                                                                 MIXNOUN  SF ROUT
  2461                          16,2475   00204 1  RUTMXTAB OCT     00204               01  LANDING RADAR ALTITUDE, SECONDS
  2462                          16,2476   00204 1           OCT     00204               02  LANDING RADAR VELX, SECONDS
  2463                          16,2477   00204 1           OCT     00204               03  LANDING RADAR VELY, SECONDS
  2464                          16,2500   00204 1           OCT     00204               04  LANDING RADAR VELZ, SECONDS
  2465                          16,2501   00142 0           OCT     00142               05  DEGREES, ELEVATION DEGREES
  2466                          16,2502   04104 0           OCT     04104               06  RENDEZVOUS RADAR RANGE, DEG, DEG
  2467                          16,2503   04104 0           OCT     04104               07  REND. RADAR RANGE RATE, DEG, DEG
  2468                          16,2504   06204 1           OCT     06204               10  INIT/FIN ALT, INIT/FIN ALT, ALT RATE
  2469                          16,2505   00205 0           OCT     00205               11  HOURS, SECONDS
  2470                          16,2506   06043 0           OCT     06043               12  WHOLE, FRACTIONAL, WHOLE
  2471                          16,2507   16347 0           OCT     16347               13  GYRO DEGREES (FOR EACH)
  2472                          16,2510   00104 1           OCT     00104               14  OPT TRACK AZIMUTH ANGLE, DEGREES
  2473                          16,2511   00104 1           OCT     00104               15  OPT TRACK AZIMUTH ANGLE, DEGREES
  2474                          16,2512   16347 0           OCT     16347               16  POSITION (FOR EACH)
  2475                          16,2513   12245 1           OCT     12245               17  VELOCITY (FOR EACH)
  2476                          16,2514   06345 0           OCT     06345               20  TIME WEEKS, POSITION, WHOLE
  2477                          16,2515   16247 1           OCT     16247               21  POSITION, VELOCITY, POSITION
  2478                          16,2516   16347 0           OCT     16347               22  POSITION (FOR EACH)
  2479                          16,2517   12245 1           OCT     12245               23  VELOCITY (FOR EACH)
 A2480                                                                                 END OF RUTMXTAB

  2481                                    16,2520  ENDPINS3 EQUALS
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P2482   MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED


 2483   REF   2 LAST 343                 5161            SETLOC DATWAIT1 +2

R2484   SETNCADR          E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R2485                     ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

 2486   REF   7 LAST 330          5161  54 304 1  SETNCADR TS      NOUNCADR          STORE ECADR
 2487   REF  14 LAST 283          5162  54 003 0           TS      EBANK             SET EBANK BITS
 2488   REF   4 LAST 203          5163  7 5235 1           MASK    LOW8
 2489   REF   1                   5164  6 5236 0           AD      OCT1400
 2490   REF  24 LAST 326          5165  54 131 0           TS      NOUNADD           PUT E ADRES INTO NOUNADD
 2491   REF 211 LAST 347          5166  0 0002 0           TC      Q


R2492   SETNADD           GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R2493                     E ADRES AND PUTS IT INTO NOUNADD.

 2494   REF   8 LAST 355          5167  3 0304 0  SETNADD  CA      NOUNCADR
 2495   REF   6 LAST 322          5170  1 5162 0           TCF     SETNCADR +1


R2496   SETEBANK          E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R2497                     DERIVED AND LEFT IN A.

 2498   REF  15 LAST 355          5171  54 003 0  SETEBANK TS      EBANK             SET EBANK BITS
 2499   REF   5 LAST 355          5172  7 5235 1           MASK    LOW8
 2500   REF   2 LAST 355          5173  6 5236 0           AD      OCT1400           E ADRES LEFT IN A
 2501   REF 212 LAST 355          5174  0 0002 0           TC      Q


 2502                             5175   00016 0  R1D1     OCT     16
 2503                             5176   00011 1  R2D1     OCT     11
 2504                             5177   00004 0  R3D1     OCT     4

 2505   REF  38 LAST 341          5200  54 020 1  RIGHT5   TS      CYR
 2506   REF  39 LAST 355          5201  4 0020 1           CS      CYR
 2507   REF  40 LAST 355          5202  4 0020 1           CS      CYR
 2508   REF  41 LAST 355          5203  4 0020 1           CS      CYR
 2509   REF  42 LAST 355          5204  4 0020 1           CS      CYR
 2510   REF  43 LAST 355          5205  56 020 0           XCH     CYR
 2511   REF 213 LAST 355          5206  0 0002 0           TC      Q

 2512   REF  15 LAST 333          5207  54 022 0  LEFT5    TS      CYL
 2513   REF  16 LAST 355          5210  4 0022 0           CS      CYL
 2514   REF  17 LAST 355      5211  4 0022 0            CS       CYL
 2515   REF  18 LAST 356      5212  4 0022 0            CS       CYL
 2516   REF  19 LAST 356      5213  4 0022 0            CS       CYL
 2517   REF  20 LAST 356      5214  56 022 1            XCH      CYL
 2518   REF 214 LAST 355      5215  0 0002 0            TC       Q

 2519                         5216  6 0000 1  SLEFT5    DOUBLE
 2520                         5217  6 0000 1            DOUBLE
 2521                         5220  6 0000 1            DOUBLE
 2522                         5221  6 0000 1            DOUBLE
 2523                         5222  6 0000 1            DOUBLE
 2524   REF 215 LAST 356      5223  0 0002 0            TC       Q


 2525                         5224   00037 0  LOW5      OCT      37
 2526                         5225   01740 0  MID5      OCT      1740
 2527                         5226   76000 0  HI5       OCT      76000          MUST STAY HERE

 2528   REF  14 LAST 329      5227  0 4363 0  TCNOVAC   TC       NOVAC
 2529   REF  35 LAST 329      5230  0 4536 0  TCWAIT    TC       WAITLIST
 2530   REF  27 LAST 329      5231  0 4602 1  TCTSKOVR  TC       TASKOVER
 2531   REF   5 LAST 267      5232  0 4374 0  TCFINDVC  TC       FINDVAC


 2532                         5233   30000 1  CHRPRIO   OCT      30000          EXEC PRIORITY OF CHARIN


 2533                         5234   03777 0  LOW11     OCT      3777
 2534   REF   7 LAST 322                5234  B12-1     EQUALS   LOW11
 2535                         5235   00377 1  LOW8      OCT      377
 2536                         5236   01400 1  OCT1400   OCT      1400


 2537                         5237   00023 0  VD1       OCT      23
 2538                         5240   00021 1  ND1       OCT      21
 2539                         5241   00025 0  MD1       OCT      25

 2540                         5242   00012 1  BINCON    DEC      10

 2541   REF  19 LAST 302      5243  3 7651 1  FALTON    CA       BIT7           TURN ON OPERATOR ERROR LIGHT
 2542                         5244  0 0006 1            EXTEND
 2543   REF   8 LAST 337      5245  05 011 1            WOR      DSALMOUT       BIT 7 OF CHANNEL 11
 2544   REF 216 LAST 356      5246  0 0002 0            TC       Q

 2545   REF  20 LAST 356      5247  4 7651 0  FALTOF    CS       BIT7           TURN OFF OPERATOR ERROR LIGHT
 2546                         5250  0 0006 1            EXTEND
 2547   REF   9 LAST 356      5251  03 011 1            WAND    DSALMOUT          BIT 7 OF CHANNEL 11
 2548   REF 217 LAST 356      5252  0 0002 0            TC      Q

 2549   REF  10 LAST 259      5253  3 7653 0  RELDSPON  CAF     BIT5              TURN ON KEY RELEASE LIGHT
 2550                         5254  0 0006 1            EXTEND
 2551   REF  10 LAST 357      5255  05 011 1            WOR     DSALMOUT          BIT 5 OF CHANNEL 11
 2552   REF 218 LAST 357      5256  0 0002 0            TC      Q

 2553                         5257  0 0006 1  LODSAMPT  EXTEND
 2554   REF   9 LAST 348      5260  3 0025 0            DCA     TIME2
 2555   REF   3 LAST 353      5261  52 014 0            DXCH    SAMPTIME
 2556   REF 219 LAST 357      5262  0 0002 0            TC      Q


 2557                         5263  0 0006 1  TPSL1     EXTEND                    SHIFTS MPAC, +1, +2 LEFT 1
 2558   REF 528 LAST 341      5264  3 0142 0            DCA     MPAC      +1      LEAVES OVFIND SET TO +/- 1 FOR OF/UF
 2559   REF 529 LAST 357      5265  20 142 1            DAS     MPAC      +1
 2560   REF 530 LAST 357      5266  6 0140 1            AD      MPAC
 2561   REF 531 LAST 357      5267  26 140 0            ADS     MPAC
 2562                         5270  54 007 1            TS      7                 TS A DOES NOT CHANGE A ON OF/UF.
 2563   REF 220 LAST 357      5271  0 0002 0            TC      Q                 NO NET OF/UF
 2564   REF  20 LAST 327      5272  54 105 1            TS      OVFIND            OVFIND SET TO +/- 1 FOR OF/UF
 2565   REF 221 LAST 357      5273  0 0002 0            TC      Q


 2566   REF  26 LAST 299      5274  3 7652 1  FLASHON   CAF     BIT6              TURN ON V/N FLASH
 2567                         5275  0 0006 1            EXTEND                    BIT 6 OF CHANNEL 11
 2568   REF  11 LAST 357      5276  05 011 1            WOR     DSALMOUT
 2569   REF 222 LAST 357      5277  0 0002 0            TC      Q


 2570   REF  27 LAST 357      5300  4 7652 0  FLASHOFF  CS      BIT6              TURN OFF V/N FLASH
 2571                         5301  0 0006 1            EXTEND
 2572   REF  12 LAST 357      5302  03 011 1            WAND    DSALMOUT          BIT 6 OF CHANNEL 11
 2573   REF 223 LAST 357      5303  0 0002 0            TC      Q
```

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R2574   INTERNAL ROUTINES THAT USE THE KEYBOARD AND DISPLAY SYSTEM(THRU
R2575   NVSUB) MUST  TC GRABDSP  BEFOREHAND , TO GRAB THE DISPLAY SYSTEM AND
R2576   MAKE IT BUSY TO OTHER INTERNAL USERS.

R2577          WHEN FINISHED , THERE MUST BE A TC FREEDSP , TO RELEASE THE
R2578   SYSTEM FOR OTHER INTERNAL USERS.

R2579          THE CALLING SEQUENCES ARE
R2580   L          TC     GRABDSP
R2581   L+1        RETURN HERE WHEN SYSTEM IS ALREADY GRABBED
R2582   L+2        RETURN HERE MEANS YOU HAVE IT

R2583   L          TC     NVSUB
R2584   L+1        RETURN HERE IF OPERATOR HAS INTERVENED
R2585   L+2        RETURN HERE AFTER EXECUTION


R2586          A ROUTINE CALLED GRABUSY IS PROVIDED (USE IS OPTIONAL) TO PUT YOUR
R2587   JOB TO SLEEP UNTIL  THE SYSTEM IS FREED BY THE JOB HOLDING IT.
R2588   GRABUSY CANNOT BE CALLED FROM E MEMORY, SINCE JOBSLEEP AND JOBWAKE
R2589   HANDLE ONLY FIXED MEMORY.
R2590   YOUR CADR IS PUT AT FIRST AVAILABLE SLOT IN A WAITING LIST (FIFO).

R2591          THE CALLING SEQUENCE IS
R2592              CAF    WAKEFCADR
R2593              TC     GRABUSY

R2594          A ROUTINE CALLED  NVSUBUSY IS PROVIDED (USE IS OPTIONAL)  TO PUT
R2595   YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES IT.
R2596   NVSUBUSY CANNOT BE CALLED FROM E MEMORY, SINCE JOBSLEEP AND JOBWAKE
R2597   HANDLE ONLY FIXED MEMORY.
R2598                                                YOUR CADR IS PUT
R2599   ON TOP OF A WAITING LIST (FIFO). IT ALSO TURNS ON KEY RELEASE LIGHT.

R2600           THE CALLING SEQUENCE IS
R2601              CAF    WAKEFCADR
R2602              TC     NVSUBUSY


R2603   AFTER A TC FREEDSP, THE INTERNAL INTERLOCK IS KEPT BUSY FOR 10 SECONDS,
R2604   AFTER WHICH A CADR IS CALLED FROM THE LIST. THIS INSURES THAT ALL
R2605   DISPLAYS WAITING WILL BE VISIBLE.


R2606   GRABLOCK IS THE INTERNAL INTERLOCK FOR THE USE OF THE KEYBOARD
R2607   AND DISPLAY SYSTEM.
R2608   +0  FREE
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R2609    +1  SOME INTERNAL ROUTINE HAS GRABBED DSP SYST
R2610    +2  SOME INTERNAL ROUTINE HAS GONE TO NVSUBUSY


 2611    REF   3 LAST 328         5304  10 324 0  GRABDSP   CCS     GRABLOCK
 2612    REF 224 LAST 357         5305   0 0002 0           TC      Q                   ALREADY GRABBED, RETURN TO L+1
 2613    REF  97 LAST 347         5306   3 7657 1           CAF     ONE                 NOT GRABBED, SET TO +1
 2614    REF   4 LAST 359         5307  54 324 0            TS      GRABLOCK            AND RETURN TO L+2
 2615    REF 225 LAST 359         5310  50 002 0            INDEX   Q
 2616                             5311   0 0001 0           TC      1


 2617    REF  16 LAST 347         5312   3 6426 1  PREGBSY  CAF     LOW10               SPECIAL ENTRANCE FOR ROUTINES IN FIXED
 2618    REF 226 LAST 359         5313   7 0002 1           MASK    Q                   BANKS ONLY DESIRING THE FCADR OF
 2619    REF  36 LAST 342         5314   6 0004 0           AD      FBANK               1 + (LOC FROM WHICH TC PREGBSY WAS DONE)
 2620    REF  17 LAST 335         5315   0 4102 0  GRABUSY  TC      POSTJUMP            TO BE ENTERED.
 2621    REF   1                  5316    10000 0           CADR    GRABUSYB
 2622    REF   2 LAST 343                04,3454            SETLOC  DOPROC   +2
 2623    REF  81 LAST 343      04,3454  54 001 1   GRABUSY1 TS      L
 2624    REF   5 LAST 359      04,3455  10 324 0            CCS     GRABLOCK
 2625                          04,3456   0 3461 1           TC      +3                  STILL GRABBED
 2626    REF  82 LAST 359      04,3457   3 0001 0           CA      L                   NOT GRABBED SO DO DIRECT CALL
 2627    REF  10 LAST 335      04,3460   0 4105 1           TC      BANKJUMP
 2628    REF  47 LAST 347      04,3461   3 7656 0           CAF     TWO
 2629    REF   1               04,3462  54 130 1            TS      LSTPTR
 2630    REF   2 LAST 359      04,3463  50 130 0            INDEX   LSTPTR              SEARCH LIST FOR FIRST AVAILABLE SPACE
 2631    REF   4 LAST 158      04,3464  10 327 0            CCS     DSPLIST             FROM BOTTOM.
 2632                          04,3465   0 3467 1           TC      +2
 2633    REF   1               04,3466   0 3472 0           TC      PUTINLST            SPACE FOUND
 2634    REF   3 LAST 359      04,3467  10 130 1            CCS     LSTPTR              DECREMENT POINTER
 2635                          04,3470   0 3462 1           TC      -6
 2636    REF   1               04,3471   0 3536 1           TC      LSTFULL
 2637    REF  83 LAST 359      04,3472   3 0001 0  PUTINLST CA      L
 2638    REF   4 LAST 359      04,3473  50 130 0            INDEX   LSTPTR
 2639    REF   5 LAST 359      04,3474  54 327 0            TS      DSPLIST
 2640    REF   4 LAST 342      04,3475   0 4416 0           TC      JOBSLEEP


R2641    GRABWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R2642    SYSTEM IS NOT GRABBED, IT GRABS IT AND RETURNS TO L+1 ( L = LOC FROM
R2643    WHICH THE TC GRABWAIT WAS DONE). IF SYSTEM IS GRABBED, IT PUTS CALLING
R2644    JOB TO SLEEP WITH L+1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN
R2645    SYSTEM IS FREED.

 2646    REF   1                            5317            SETLOC  GRABUSY  +2
 2647    REF   6 LAST 359         5317  10 324 0   GRABWAIT CCS     GRABLOCK
 2648    REF   1                  5320   1 5312 0           TCF     PREGBSY             GRABBED. PUT L+1 INTO LIST. GO TO SLEEP.
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  2649  REF  98 LAST 359         5321  3 7657 1            CAF     ONE               NOT GRABBED. GRAB AND RETURN TO L+1.
  2650  REF   7 LAST 359         5322  54 324 0            TS      GRABLOCK
  2651  REF 227 LAST 359         5323  0 0002 0            TC      Q


  2652  REF   1                  5324  4 5331 1  PRENVBSY  CS      2K+3              SPECIAL ENTRANCE FOR ROUTINES IN FIXED
  2653  REF 228 LAST 360         5325  6 0002 0            AD      Q                 BANKS ONLY DESIRING THE FCADR OF(LOC
  2654  REF  37 LAST 359         5326  6 0004 0            AD      FBANK             FROM WHICH THE TC PRENVBSY WAS DONE) -2
  2655  REF  18 LAST 359         5327  0 4102 0  NVSUBUSY  TC      POSTJUMP          TO BE ENTERED.
  2656  REF   1                  5330   10001 1            CADR    NVSUBSYB
  2657                           5331   02003 0  2K+3      OCT     2003

  2658  REF   2 LAST 359               04,3476             SETLOC  PUTINLST  +4
  2659  REF  84 LAST 359      04,3476  54 001 1  NVSUBSY1  TS      L
  2660  REF   8 LAST 342      04,3477  10 277 1            CCS     DSPLOCK           TEST IF REALLY LOCKED OUT
  2661                        04,3500  0 3503 1            TC      +3                STILL BUSY
  2662  REF  85 LAST 360      04,3501  3 0001 0            CA      L                 DSPLOCK = +0 SO RETURN DIRECTLY
  2663  REF  11 LAST 359      04,3502  0 4105 1            TC      BANKJUMP
  2664  REF  48 LAST 359      04,3503  3 7656 0            CAF     TWO               SET FOR GRABBED STATE AND NVSUBUSY USE
  2665  REF   8 LAST 360      04,3504  54 324 0            TS      GRABLOCK
  2666  REF  86 LAST 360      04,3505  3 0001 0            CA      L
  2667  REF   6 LAST 359      04,3506  56 331 0            XCH     DSPLIST +2        ENTER CADR INTO FIRST POSITION OF LIST
  2668  REF   7 LAST 360      04,3507  56 330 1            XCH     DSPLIST +1                  (BOTTOM)
  2669  REF   8 LAST 360      04,3510  56 327 1            XCH     DSPLIST
  2670  REF 231 LAST 348      04,3511  10 000 0            CCS     A
  2671  REF   2 LAST 359      04,3512  0 3536 1            TC      LSTFULL
  2672                        04,3513  0 3515 0            TC      +2
  2673  REF   3 LAST 360      04,3514  0 3536 1            TC      LSTFULL
  2674  REF   2 LAST 330      04,3515  0 5253 0            TC      RELDSPON
  2675  REF  87 LAST 360      04,3516  3 0001 0            CA      L
  2676  REF   5 LAST 359      04,3517  0 4416 0  ENDNVBSY  TC      JOBSLEEP


 R2677  NVSBWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
 R2678  SYSTEM IS NOT BUSY, IT EXECUTES V/N AND RETURNS TO L+1 (L= LOC FROM
 R2679  WHICH THE TC NVSBWAIT WAS DONE). IF SYSTEM IS BUSY, IT PUTS CALLING JOB
 R2680  TO SLEEP WITH L-1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN SYSTEM
 R2681  IS NOT BUSY.

  2682  REF   2 LAST 276                  5332             SETLOC  NVSUBUSY +3
  2683  REF   8 LAST 341         5332  54 107 0  NVSBWAIT  TS      NVTEMP
  2684  REF   9 LAST 360         5333  10 277 1            CCS     DSPLOCK
  2685  REF   1                  5334  1 5337 1            TCF     NVSBWT1           BUSY
  2686  REF 229 LAST 360         5335  3 0002 0            CA      Q                 FREE. NVSUB WILL SAVE L+1 FOR RETURN
  2687  REF   3 LAST 276         5336  1 5114 1            TCF     NVSUB    +5       AFTER EXECUTION.
  2688  REF 230 LAST 360         5337  24 002 0  NVSBWT1   INCR    Q                 L+2. PRENVBSY WILL PUT L-1 INTO LIST AND
  2689  REF   1                  5340  1 5324 0            TCF     PRENVBSY          GO TO SLEEP.
 2690   REF 231 LAST 360      5341  56 002 0  RELDSP   XCH     Q              SET DSPLOCK TO +0, TURN RELDSP LIGHT
 2691   REF   1               5342  54 130 1           TS      RELRET         OFF.  SEARCH DSPLIST
 2692   REF   6 LAST 315      5343  3 7667 1           CAF     NEG1
 2693   REF   9 LAST 360      5344  6 0324 1           AD      GRABLOCK
 2694                         5345  0 0006 1           EXTEND                 SEARCH LIST ONLY IF GRABLOCK = +2
 2695   REF   1               5346  6 5354 0           BZMF    RELDSP2          (SOMEONE USED NVSUBUSY)
 2696   REF   1               5347  0 5367 0           TC      WKSEARCH
 2697   REF   2 LAST 361      5350  0 5354 0           TC      RELDSP2        LIST EMPTY
 2698   REF   4 LAST 343      5351  0 4422 1           TC      JOBWAKE        LIST NOT EMPTY
 2699   REF  99 LAST 360      5352  3 7657 1           CAF     ONE
 2700   REF  10 LAST 361      5353  54 324 0           TS      GRABLOCK
 2701                         5354  0 0004 0  RELDSP2  INHINT
 2702   REF  11 LAST 357      5355  4 7653 1           CS      BIT5           TURN OFF KEY RELEASE LIGHT
 2703                         5356  0 0006 1           EXTEND                 (BIT 5 OF CHANNEL 11)
 2704   REF  13 LAST 357      5357  03 011 1           WAND    DSALMOUT
 2705   REF 134 LAST 344      5360  3 7665 0           CAF     ZERO
 2706   REF  10 LAST 360      5361  54 277 1           TS      DSPLOCK
 2707                         5362  0 0003 1           RELINT
 2708   REF   2 LAST 361      5363  0 0130 0           TC      RELRET
 2709   REF 232 LAST 361      5364  56 002 0  RELDSP1  XCH     Q              SET DSPLOCK TO +0, RELDSP LIGHT OFF,
 2710   REF   3 LAST 361      5365  54 130 1           TS      RELRET         NO LIST SEARCH
 2711   REF   3 LAST 361      5366  0 5354 0           TC      RELDSP2


 2712   REF 135 LAST 361      5367  3 7665 0  WKSEARCH CAF     ZERO           SEARCHES LIST. LEAVES RESULT IN A.
 2713   REF   9 LAST 360      5370  56 327 1           XCH     DSPLIST        IF EMPTY, RETURN TO L+1.
 2714   REF  10 LAST 361      5371  56 330 1           XCH     DSPLIST +1     IF NOT EMPTY, INHINT AND RETURN TO L+2.
 2715   REF  11 LAST 361      5372  56 331 0           XCH     DSPLIST +2
 2716                         5373  0 0006 1           EXTEND
 2717                         5374  1 5400 1           BZF     +4             EMPTY
 2718                         5375  0 0004 0           INHINT                 NOT EMPTY
 2719   REF 233 LAST 361      5376  50 002 0           INDEX   Q              RETURN TO L+2
 2720                         5377  0 0001 0           TC      1
 2721   REF 234 LAST 361      5400  0 0002 0           TC      Q              RETURN TO L+1


 2722   REF 235 LAST 361      5401  56 002 0  FREEDSP  XCH     Q
 2723   REF   1               5402  54 130 1           TS      FREERET
 2724                         5403  0 0004 0           INHINT
 2725   REF   1               5404  3 5412 0           CAF     SHOTIME
 2726   REF  36 LAST 356      5405  0 4536 0           TC      WAITLIST
 2727   REF  55 LAST 343                   E0          EBANK=  DSPCOUNT
 2728                         5406   03520 0           2CADR   FREEWAIT
C2728   REF   1               5407   10000 0
 2729                         5410  0 0003 1           RELINT
 2730   REF   2 LAST 361      5411  0 0130 0           TC      FREERET

 2731                         5412   01130 1  SHOTIME  DEC     600            6 SECOND WAITING PERIOD.
 2732                                     5413  ENDPINBF EQUALS

 2733   REF   1                      04,3520             SETLOC ENDNVBSY +1

 2734   REF   3 LAST 329    04,3520  3 5233 0  FREEWAIT CAF    CHRPRIO         CALLED BY T3RUPT
 2735   REF  15 LAST 356    04,3521  0 4363 0           TC     NOVAC
 2736   REF  56 LAST 361                   E0           EBANK= DSPCOUNT
 2737                       04,3522   03525 0           2CADR  FREDSPDO
C2737   REF   1             04,3523   10000 0
 2738   REF  28 LAST 356    04,3524  0 4602 1           TC     TASKOVER


 2739   REF   2 LAST 361    04,3525  0 5367 0  FREDSPDO TC     WKSEARCH        CALLED BY EXECUTIVE
 2740   REF   1             04,3526  0 3534 0           TC     LSTEMPTY        LIST EMPTY
 2741   REF   5 LAST 361    04,3527  0 4422 1           TC     JOBWAKE         LIST NOT EMPTY
 2742                       04,3530  0 0003 1           RELINT
 2743   REF 100 LAST 361    04,3531  3 7657 1           CAF    ONE             SET FOR GRABBED CONDITION
 2744   REF  11 LAST 361    04,3532  54 324 0           TS     GRABLOCK
 2745   REF  47 LAST 344    04,3533  0 4440 0           TC     ENDOFJOB
 2746   REF 136 LAST 361    04,3534  3 7665 0  LSTEMPTY CAF    ZERO            SET FOR FREE CONDITION
 2747                       04,3535  0 3532 0           TC     -3


 2748   REF   9 LAST 335    04,3536  0 5446 1  LSTFULL  TC     ABORT
 2749                       04,3537   01206 1           OCT    01206           PINBALL WAITING LINE FULL.

 2750                                  04,3540  ENDPINS1 EQUALS
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P2751   VBTSTLTS TURNS ON ALL DISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2752   OFF THE CAUTION AND STATUS LIGHTS.

 2753   REF    1                      05,3414          SETLOC DSPMMEND +1

 2754                       05,3414  0 0004 0  VBTSTLTS INHINT
 2755   REF   30 LAST 336   05,3415  4 7657 0           CS     BIT1             SET BIT 1 OF IMODES33 SO IMUMON WONT
 2756   REF   12 LAST 299   05,3416  7 0370 1           MASK   IMODES33         TURN OUT ANY LAMPS.
 2757   REF   31 LAST 363   05,3417  6 7657 1           AD     BIT1
 2758   REF   13 LAST 363   05,3420  54 370 1           TS     IMODES33

 2759   REF    1            05,3421  3 3457 1           CAF    TSTCON1          TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2760                       05,3422  0 0006 1           EXTEND                  V/N FLASH, OPERATOR ERROR.
 2761   REF   14 LAST 361   05,3423  05 011 1           WOR    DSALMOUT
 2762   REF    1            05,3424  3 3460 0           CAF    TSTCON2          TURN ON NO ATT, GIMBAL LOCK, TRACKER,
 2763   REF   28 LAST 338   05,3425  54 322 0           TS     DSPTAB  +11D     PROG ALM.
 2764   REF   30 LAST 300   05,3426  3 7646 1           CAF    BIT10            TURN ON TEST ALARM OUTBIT
 2765                       05,3427  0 0006 1           EXTEND
 2766   REF    2 LAST 300   05,3430  05 013 0           WOR    CHAN13
 2767   REF    4 LAST 296   05,3431  3 7661 1           CAF    TEN
 2768   REF    5 LAST 300   05,3432  54 103 1  TSTLTS1  TS     ERCNT
 2769   REF    1            05,3433  4 3455 1           CS     FULLDSP
 2770   REF    6 LAST 363   05,3434  50 103 0           INDEX  ERCNT
 2771   REF   29 LAST 363   05,3435  54 307 1           TS     DSPTAB
 2772   REF    7 LAST 363   05,3436  10 103 1           CCS    ERCNT
 2773   REF    1            05,3437  0 3432 1           TC     TSTLTS1
 2774   REF    1            05,3440  4 3456 1           CS     FULLDSP1
 2775   REF   30 LAST 363   05,3441  54 310 1           TS     DSPTAB  +1       TURN ON 3 PLUS SIGNS
 2776   REF   31 LAST 363   05,3442  54 313 1           TS     DSPTAB  +4
 2777   REF   32 LAST 363   05,3443  54 315 1           TS     DSPTAB  +6
 2778   REF    2 LAST  76   05,3444  3 7660 0           CAF    ELEVEN
 2779   REF    7 LAST 334   05,3445  54 303 0           TS     NOUT
 2780                       05,3446  0 0003 1           RELINT
 2781   REF    1            05,3447  3 3462 1           CAF    SHOLTS
 2782                       05,3450  0 0004 0           INHINT
 2783   REF   37 LAST 361   05,3451  0 4536 0           TC     WAITLIST
 2784   REF   33 LAST 363                  E0           EBANK= DSPTAB
 2785                       05,3452   03463 0           2CADR  TSTLTS2
C2785   REF    1            05,3453   12000 1
 2786   REF   48 LAST 362   05,3454  0 4440 0           TC     ENDOFJOB         DSPLOCK IS LEFT BUSY (FROM KEYBOARD
A2787                                                                           ACTION) UNTIL TSTLTS3 TO INSURE THAT
A2788                                                                           LIGHTS TEST WILL BE SEEN.


 2789                       05,3455   05675 0  FULLDSP  OCT    05675            DISPLAY ALL 8:S
 2790                       05,3456   07675 1  FULLDSP1 OCT    07675            DISPLAY ALL 8:S AND +
 2791                       05,3457   00175 1  TSTCON1  OCT    00175
A2792                                                                           UPLINK ACTIVITY, TEMP, KEY RLSE,
A2793                                                                           V/N FLASH, OPERATOR ERROR.
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  2794                      05,3460    40650 0  TSTCON2   OCT      40650             DSPTAB+11D  BITS 4,6,8,9.
 A2795                                                                               NO ATT, GIMBAL LOCK, TRACKER, PROG ALM.
  2796                      05,3461    00115 1  TSTCON3   OCT      00115             CHAN 11  BITS 1, 3, 4, 7.
 A2797                                                                               UPLINK ACTIVITY, TEMP, OPERATOR ERROR.
  2798                      05,3462    00764 1  SHOLTS    OCT      764               5 SEC


  2799  REF  4 LAST 362     05,3463   3 5233 0  TSTLTS2   CAF      CHRPRIO           CALLED BY WAITLIST
  2800  REF 16 LAST 362     05,3464   0 4363 0            TC       NOVAC
  2801  REF 34 LAST 363                     E0            EBANK=   DSPTAB
  2802                      05,3465    03470 1            2CADR    TSTLTS3
 C2802  REF  1              05,3466    12000 1
  2803  REF 29 LAST 362     05,3467   0 4602 1            TC       TASKOVER


  2804  REF  1              05,3470   4 3461 0  TSTLTS3   CS       TSTCON3           CALLED BY EXECUTIVE
  2805                      05,3471   0 0004 0            INHINT
  2806                      05,3472   0 0006 1            EXTEND                     TURN OFF  UPLINK ACTIVITY, TEMP,
  2807  REF 15 LAST 363     05,3473   03 011 1            WAND     DSALMOUT          OPERATOR ERROR.
  2808  REF 31 LAST 363     05,3474   4 7646 0            CS       BIT10             TURN OFF TEST ALARM OUTBIT
  2809                      05,3475   0 0006 1            EXTEND
  2810  REF  3 LAST 363     05,3476   03 013 0            WAND     CHAN13
  2811  REF 29 LAST 342     05,3477   3 7641 0            CAF      BIT15             TURN OFF AUTO, HOLD, FREE, NO ATT, SPARE
  2812  REF 35 LAST 364     05,3500   54 322 0            TS       DSPTAB   +11D     GIMBAL LOCK, SPARE, TRACKER, PROG ALM
  2813  REF  1              05,3501   4 3521 0            CS       13-11,1           SET BITS TO INDICATE ALL LAMPS OUT. TEST
  2814  REF 14 LAST 363     05,3502   7 0370 1            MASK     IMODES33          LIGHTS COMPLETE.
  2815  REF  4 LAST 299     05,3503   6 4515 1            AD       PRIO16
  2816  REF 15 LAST 364     05,3504   54 370 1            TS       IMODES33

  2817  REF  1              05,3505   4 3523 1            CS       OCT55000
  2818  REF 56 LAST 299     05,3506   7 0367 1            MASK     IMODES30
  2819  REF  2 LAST 177     05,3507   6 4514 0            AD       PRIO15            15000.
  2820  REF 57 LAST 364     05,3510   54 367 1            TS       IMODES30

  2821  REF  1              05,3511   4 3522 0            CS       RFAILS2
  2822  REF 75 LAST 300     05,3512   7 0413 0            MASK     RADMODES
  2823  REF 21 LAST 356     05,3513   6 7651 1            AD       BIT7
  2824  REF 76 LAST 364     05,3514   54 413 0            TS       RADMODES

  2825                      05,3515   0 0003 1            RELINT

  2826  REF  3 LAST 152     05,3516   0 2001 1            TC       DSPMM             REDISPLAY C(MODREG)
  2827  REF 19 LAST 360     05,3517   0 4102 0            TC       POSTJUMP          TURN OFF KEY RLSE LIGHT (AND SEARCH LIST
  2828  REF  2 LAST 306     05,3520    11315 0            CADR     VBTERM            IF APPROPRIATE).
 A2829                                                                               TURN OFF V/N FLASH, SET LOADSTAT FOR
 A2830                                                                               FOR TERMINATE CONDITION, AND GO TO
 A2831                                                                               RECALTST. FINALLY DO TC ENDOFJOB.
```

```
L        PINBALL GAME  BUTTONS AND LIGHTS                                          USER'S OWN PAGE NO.  77

 2832                          05,3521    16001 1  13-11,1   OCT      16001
 2833                          05,3522    00330 1  RFAILS2   OCT      330                 RADAR CDU AND DATA FAIL FLAGS.
 2834                          05,3523    55000 1  OCT55000  OCT      55000
 2835                                     05,3524  ENDPINS2  EQUALS
```

```
L       ALARM AND ABORT                                                           USER'S OWN PAGE NO.   1

R0001            THE FOLLOWING SUBROUTINE MAY BE CALLED TO DISPLAY A NON-ABORTIVE ALARM CONDITION. IT MAY BE CALLED
R0003   EITHER IN INTERRUPT OR UNDER EXECUTIVE CONTROL.

R0004            CALLING SEQUENCE IS AS FOLLOWS:

R0005            TC     ALARM
R0006            OCT    AAANN           ALARM NO. NN IN GENERAL AREA AAA.
R0007                                   (RETURNS HERE)

 0008   REF   1                            5413           SETLOC ENDPINBF
 0009   REF   4 LAST 348                     E2           EBANK= FAILREG

 0010                           5413  0 0004 0  ALARM     INHINT
 0011   REF 236 LAST 361        5414  56 002 0            XCH    Q
 0012   REF  15 LAST 285        5415  54 077 0            TS     RUPTREG4

 0013   REF   5 LAST 366        5416  11'363 1            CCS    FAILREG         SEE IF ONE FAILURE HAS OCCURRED SINCE
A0014                                                                             THE LAST ERROR RESET.
 0015   REF   1                 5417  0 5425 1            TC     MULTFAIL        YES - INDICATE MULTIPLE FAILURES.
 0016   REF   1                 5420  0 5430 0            TC     NEWALARM        FIRST SINCE RESET.

 0017   REF  16 LAST 366        5421  3 0077 1  MULTEXIT  CA     RUPTREG4        FREE RUPTREG4 BEFORE RELINT.
 0018                           5422  0 0003 1            RELINT
 0019   REF 232 LAST 360        5423  50 000 1            INDEX  A
 0020                           5424  0 0001 0            TC     1               RETURN TO CALLER.

 0021   REF   3 LAST 141        5425  6 6042 1  MULTFAIL  AD     OCT40001        BIT 15 = 1 INDICATES MULTIPLE FAILURES.
 0022   REF   6 LAST 366        5426  55'363 1            TS     FAILREG
 0023   REF   1                 5427  0 5421 0            TC     MULTEXIT

 0024   REF   1                 5430  0 5440 1  NEWALARM  TC     PROGLARM        TURN ON THE PROGRAM ALARM LIGHT.

 0025   REF   2 LAST 153        5431  3 4535 0            CAF    PRIO37
 0026   REF  17 LAST 364        5432  0 4363 0            TC     NOVAC
 0027                           5433   02773 0            2CADR  DOALARM         CALL (SEPARATE) JOB FOR DISPLAY.
C0027   REF   2 LAST 153        5434   02002 1
 0028   REF  17 LAST 366        5435  50 077 1            INDEX  RUPTREG4
 0029                           5436  3 0000 1            CAF    0
 0030   REF   2 LAST 366        5437  0 5426 1            TC     MULTFAIL +1

 0031   REF   1                 5440  4 5445 0  PROGLARM  CS     OCT40400        TURN ON PROGRAM ALARM LIGHT VIA OUT0.
 0032   REF  36 LAST 364        5441  7 0322 0            MASK   DSPTAB +11D
 0033   REF   2 LAST 366        5442  6 5445 1            AD     OCT40400
 0034   REF  37 LAST 366        5443  54 322 0            TS     DSPTAB +11D
 0035   REF 237 LAST 366        5444  0 0002 0            TC     Q

 0036                           5445   40400 1  OCT40400  OCT    40400
```

```
L      ALARM AND ABORT                                                       USER'S OWN PAGE NO.  2

P0037        THE FOLLOWING ROUTINE IS CALLED TO INITIATE AN ABORT. FAILREG IS SET (ACCORDING TO THE MULTIPLE
R0039  FAILURES CONVENTION) AND A RE-START IS INITIATED BY TC-SELF. THIS IS CALLED ONLY UNDER RARE CIRCUMSTANCES.

 0041                        5446  0 0004 0  ABORT     INHINT            MAY BE CALLED IN INTERRUPT OR UNDER EXEC
 0042  REF 238 LAST 366      5447  50 002 0            INDEX   Q         PICK UP FAILURE CODE.
 0043                        5450  3 0000 1            CAF     0
 0044  REF  45 LAST 279      5451  54 065 0            TS      ITEMP1

 0045  REF   7 LAST 366      5452  11'363 1            CCS     FAILREG   SEE IF THIS IS A MULTIPLE FAILURE.
 0046  REF   1               5453  0 5456 0            TC      SETMULTF  SET BIT 15 TO INDICATE YES.
 0047  REF   1               5454  0 5460 0            TC      NEWABORT  FIRST FAILURE.

 0048  REF   1               5455  0 5455 0  WHIMPER   TC      WHIMPER   NOT WITH A BANG...

 0049  REF   4 LAST 366      5456  6 6042 1  SETMULTF  AD      OCT40001  RESTORE AND SET BIT 15.
 0050                        5457  0 5462 1            TC      +3

 0051  REF   2 LAST 366      5460  0 5440 1  NEWABORT  TC      PROGLARM  FIRST FAILURE - TURN ON ALARM LIGHT.
 0052  REF  46 LAST 367      5461  56 065 1            XCH     ITEMP1
 0053  REF   8 LAST 367      5462  55'363 1   +3       TS      FAILREG
 0054  REF   2 LAST 367      5463  0 5455 0            TC      WHIMPER   UNIVERSAL ABORT LOCATION.

 0055  REF 239 LAST 367      5464  56 002 0  CCSHOLE   XCH     Q
 0056  REF   3 LAST 300      5465  55'364 0            TS      SFAIL

 0057  REF  10 LAST 362      5466  0 5446 1            TC      ABORT
 0058                        5467   01103 1            OCT     1103

 0059                                 5470  ENDFAILF  EQUALS

R0060        JOB WHICH CALLS NVSJB FOR ALARM DISPLAY.

 0061  REF   1                     01,2773             SETLOC  ENDWAITS

 0062  REF  10 LAST 276   01,2773  0 5317 1  DOALARM   TC      GRABWAIT  DISPLAY FAILREG.
 0063  REF   1            01,2774  3 2777 1            CAF     FAILDISP
 0064  REF  22 LAST 278   01,2775  0 5332 0            TC      NVSBWAIT

 0065  REF   7 LAST 278   01,2776  0 4437 0            TC      EJFREE    FREE DISPLAY AND END JOB.

 0066                     01,2777   00531 0  FAILDISP  OCT     00531

 0067                              01,3000  ENDFAILS  EQUALS
 0001   REF   1                            11,3264       SETLOC  ENDEXTVS
 0002   REF   3 LAST 349                        E6       EBANK=  PCOM

 0003   REF  30 LAST 364     11,3264  3 7641 0  RHCNTRL  CAF     BIT15
 0004                        11,3265  0 0006 1           EXTEND
 0005                        11,3266  02 031 1           RAND    31                  CHECK PGNCS CONTROL OF S/C
 0006                        11,3267  0 0006 1           EXTEND
 0007                        11,3270  1 3272 1           BZF     +2
 0008   REF   1              11,3271  1 3353 0           TCF     NORATE
 0009   REF  14 LAST 337     11,3272  3 7655 0           CAF     BIT3
 0010                        11,3273  0 0006 1           EXTEND
 0011                        11,3274  02 031 1           RAND    31                  CHECK OUT-OF-DETENT BIT
 0012   REF 233 LAST 366     11,3275  10 000 0           CCS     A
 0013   REF   2 LAST 368     11,3276  1 3353 0           TCF     NORATE

 0014   REF 137 LAST 362     11,3277  3 7665 0           CAF     ZERO                ZERO COUNTERS
 0015   REF   1              11,3300  54 042 0           TS      RHCP
 0016   REF   1              11,3301  54 043 1           TS      RHCY
 0017   REF   1              11,3302  54 044 0           TS      RHCR
 0018   REF  19 LAST 249     11,3303  3 7650 0           CAF     BIT8                ENABLE COUNTERS
 0019   REF  10 LAST 249     11,3304  6 7647 0           AD      BIT9                START READING INTO COUNTERS
 0020                        11,3305  0 0006 1           EXTEND
 0021                        11,3306  05 013 0           WOR     13
 0022   REF  12 LAST 361     11,3307  3 7653 0           CAF     BIT5
 0023   REF  38 LAST 363     11,3310  0 4536 0           TC      WAITLIST            COUNTERS FILLED
 0024                        11,3311   03314 1           2CADR   ATTCONT
C0024   REF   1              11,3312   22006 1
 0025   REF  30 LAST 364     11,3313  0 4602 1           TC      TASKOVER

 0026   REF  20 LAST 368     11,3314  4 7650 1  ATTCONT  CS      BIT8
 0027                        11,3315  0 0006 1           EXTEND
 0028                        11,3316  03 013 0           WAND    13                  RESET COUNTER ENABLE
 0029   REF  25 LAST 338     11,3317  3 7645 1           CAF     BIT11
 0030                        11,3320  0 0006 1           EXTEND
 0031                        11,3321  02 032 1           RAND    32                  CHECK IF IN ATTITUDE HOLD MODE
 0032                        11,3322  0 0006 1           EXTEND
 0033                        11,3323  1 3325 1           BZF     +2
 0034   REF   1              11,3324  0 3343 0           TC      XAXOVRD
 0035   REF   2 LAST 368     11,3325  3 0042 1           CA      RHCP
 0036                        11,3326  0 0006 1           EXTEND
 0037   REF  32 LAST 364     11,3327  7 7646 0           MP      BIT10
 0038   REF   1              11,3330  3 3360 1           CAF     RHCSCALE
 0039                        11,3331  0 0006 1           EXTEND
 0040   REF  88 LAST 360     11,3332  7 0001 1           MP      L
 0041   REF   4 LAST 368     11,3333  55•435 0           TS      PCOM
 0042   REF   2 LAST 368     11,3334  3 0044 1           CA      RHCR
 0043                        11,3335  0 0006 1           EXTEND
 0044   REF  33 LAST 368     11,3336  7 7646 0           MP      BIT10
 0045   REF   2 LAST 368     11,3337  3 3360 1           CAF     RHCSCALE
 0046                        11,3340  0 0006 1           EXTEND
```

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L       CONTROLLER AND METER ROUTINES                                                  USER'S OWN PAGE NO.   2

 0047   REF  89 LAST 368    11,3341   7 0001 1              MP      L
 0048   REF   1             11,3342  55'436 0              TS      RCOM
 0049   REF   2 LAST 368    11,3343   3 0043 0  XAXOVRD     CA      RHCY               YAW CHANNEL ONLY IN AUTO MODE
 0050                       11,3344   0 0006 1              EXTEND
 0051   REF  34 LAST 368    11,3345   7 7646 0              MP      BIT10
 0052   REF   3 LAST 368    11,3346   3 3360 1              CAF     RHCSCALE
 0053                       11,3347   0 0006 1              EXTEND
 0054   REF  90 LAST 369    11,3350   7 0001 1              MP      L
 0055   REF   1             11,3351  55'437 1              TS      YCOM
 0056   REF   2 LAST 275    11,3352   1 3264 0              TCF     RHCNTRL

 0057   REF 138 LAST 368    11,3353   3 7665 0  NORATE      CAF     ZERO               SET RATE COMMANDS TO ZERO
 0058   REF   5 LAST 368    11,3354  55'435 0              TS      PCOM
 0059   REF   2 LAST 369    11,3355  55'436 0              TS      RCOM
 0060   REF   2 LAST 369    11,3356  55'437 1              TS      YCOM
 0061   REF  31 LAST 368    11,3357   0 4602 1              TC      TASKOVER

 0062                       11,3360    16171 1  RHCSCALE    DEC     .44488             LEAVES INPUTS SCALED AS PI/4 RAD/SEC.
 0063                                 11,3361  ENDCMS      EQUALS
```

```
L      DOWN-TELEMETRY PROGRAM                                                                 USER'S OWN PAGE NO.   1

 0001                                  15,2000           BANK    15
 0002  REF    2 LAST  28                    E7           EBANK=  DNTMBUFF

 0003                        15,2000   00437 1  LOWIDCOD OCT     00437              FOD'S CHOICE.

R0004            SPECIAL DOWNLINK LIST FOR AGS INITIALIZATION. MUST BE IN LOCATION 2001 OF DOWNLINK FBANK.

 0006  REF    7 LAST 286     15,2001   00342 1  AGSLIST  ECADR   UPLOCK
 0007  REF    7 LAST 281     15,2002   00025 0           ECADR   TIME1
 0008  REF   10 LAST 357     15,2003   00024 1           ECADR   TIME2
 0009  REF    6 LAST 272     15,2004   00412 0           ECADR   AGSWORD
 0010  REF    1              15,2005   03602 0           ECADR   AGSBUFF +27D
 0011  REF    2 LAST 370     15,2006   03601 0           ECADR   AGSBUFF +26D
 0012  REF    3 LAST 370     15,2007   03600 1           ECADR   AGSBUFF +25D
 0013  REF    4 LAST 370     15,2010   03577 1           ECADR   AGSBUFF +24D
 0014  REF    7 LAST 370     15,2011   00412 0           ECADR   AGSWORD
 0015  REF    5 LAST 370     15,2012   03576 0           ECADR   AGSBUFF +23D
 0016  REF    6 LAST 370     15,2013   03575 0           ECADR   AGSBUFF +22D
 0017  REF    7 LAST 370     15,2014   03574 1           ECADR   AGSBUFF +21D
 0018  REF    8 LAST 370     15,2015   03573 0           ECADR   AGSBUFF +20D
 0019  REF    8 LAST 370     15,2016   00412 0           ECADR   AGSWORD
 0020  REF    9 LAST 370     15,2017   03572 1           ECADR   AGSBUFF +19D
 0021  REF   10 LAST 370     15,2020   03571 1           ECADR   AGSBUFF +18D
 0022  REF   11 LAST 370     15,2021   03570 0           ECADR   AGSBUFF +17D
 0023  REF   12 LAST 370     15,2022   03567 0           ECADR   AGSBUFF +16D
 0024  REF    9 LAST 370     15,2023   00412 0           ECADR   AGSWORD
 0025  REF   13 LAST 370     15,2024   03566 1           ECADR   AGSBUFF +15D
 0026  REF   14 LAST 370     15,2025   03565 1           ECADR   AGSBUFF +14D
 0027  REF   15 LAST 370     15,2026   03564 0           ECADR   AGSBUFF +13D
 0028  REF   16 LAST 370     15,2027   03563 1           ECADR   AGSBUFF +12D
 0029  REF   10 LAST 370     15,2030   00412 0           ECADR   AGSWORD
 0030  REF   17 LAST 370     15,2031   03562 0           ECADR   AGSBUFF +11D
 0031  REF   18 LAST 370     15,2032   03561 0           ECADR   AGSBUFF +10D
 0032  REF   19 LAST 370     15,2033   01560 0           ADRES   AGSBUFF +9D
 0033  REF   20 LAST 370     15,2034   01557 1           ADRES   AGSBUFF +8D
 0034  REF   11 LAST 370     15,2035   00412 0           ADRES   AGSWORD
 0035  REF   21 LAST 370     15,2036   01556 0           ADRES   AGSBUFF +7
 0036  REF   22 LAST 370     15,2037   01555 0           ADRES   AGSBUFF +6
 0037  REF   23 LAST 370     15,2040   01554 1           ADRES   AGSBUFF +5
 0038  REF   24 LAST 370     15,2041   01553 0           ADRES   AGSBUFF +4
 0039  REF   12 LAST 370     15,2042   00412 0           ADRES   AGSWORD
 0040  REF   25 LAST 370     15,2043   01552 1           ADRES   AGSBUFF +3
 0041  REF   26 LAST 370     15,2044   01551 1           ADRES   AGSBUFF +2
 0042  REF   27 LAST 370     15,2045   01550 0           ADRES   AGSBUFF +1
 0043  REF   28 LAST 370     15,2046   01547 0           ADRES   AGSBUFF
```

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L       DOWN-TELEMETRY PROGRAM                                                       USER'S OWN PAGE NO.   2

R0044            THIS ROUTINE IS INITITATED EVERY 20 MS BY AN INTERRUPT TRIGGERED
R0046   BY THE RECEIPT OF AN ENDPULSE FROM THE SPACECRAFT TELEMETRY PROGRAMMER.

 0047   REF   8 LAST 286     15,2047  54 016 1  DODOWNTM TS     BANKRUPT           DO APPROPRIATE TM PHASE.
 0048   REF   4 LAST 158     15,2050  51'401 0           INDEX  DNTMGOTO
 0049                        15,2051  1 0000 0           TCF    0

 0050   REF   5 LAST 272     15,2052  3 0411 0  DNPHASE1 CA     DNLSTADR           ONCE PER CYCLE (1 SECOND), AN ID IS SENT
 0051   REF   1              15,2053  55'400 0           TS     LDATALST           AND THE DATA LIST SWITCHED TO THAT
 0052   REF  17 LAST 359     15,2054  7 6426 0           MASK   LOW10              SELECTED BY A MISSION OR TEST PROGRAM.
 0053                        15,2055  0 0006 1           EXTEND
 0054   REF   1              15,2056  01 034 1           WRITE  DNTM1
 0055   REF  22 LAST 364     15,2057  4 7651 0           CS     BIT7               WORD ORDER BIT IS 0 FOR ID OWRD ONLY.
 0056                        15,2060  0 0006 1           EXTEND
 0057                        15,2061  03 013 0           WAND   13

 0058   REF   1              15,2062  3 2212 1           CAF    LDNPHAS2           SWITCH TO PHASE 2.
 0059   REF   5 LAST 371     15,2063  55'401 1           TS     DNTMGOTO
 0060   REF   1              15,2064  3 2000 0           CAF    LOWIDCOD           SPECIAL ID CODE IN L.
 0061   REF   1              15,2065  1 2151 1           TCF    TMEXITL

 0062   REF  23 LAST 371     15,2066  3 7651 1  DNPHASE2 CAF    BIT7               SET WORD ORDER BACK TO 1 FOR REMAINDER
 0063                        15,2067  0 0006 1           EXTEND                    OF CYCLE AND SET UP TO PICK UP 12 PAIRS
 0064                        15,2070  05 013 0           WOR    13                 FROM ANYWHERE IN COMMON ERASABLE OR E7.

 0065   REF 139 LAST 369     15,2071  3 7665 0           CAF    ZERO
 0066   REF  47 LAST 367     15,2072  54 065 0           TS     ITEMP1             TAKE SNAPSHOT OF 12 DP WORDS.
 0067   REF   5 LAST 363     15,2073  3 7661 1           CAF    TEN

 0068   REF  18 LAST 279     15,2074  54 066 0  LOOP     TS     ITEMP2             THESE 12 DP WORDS ARE READ INTO AN
 0069   REF   2 LAST 371     15,2075  6 1400 1           AD     LDATALST           INTERMEDIATE BUFFER SO THEY REFER TO THE
 0070                        15,2076  0 0006 1           EXTEND                    SAME POINT IN THE EXECUTION OF A MISSION
 0071   REF 234 LAST 368     15,2077  5 0000 1           INDEX  A                  PROGRAM. THE WORDS MAY BE IN NON-
 0072                        15,2100  5 0032 0           INDEX  26D
 0073                        15,2101  3 0001 0           DCA    0                  12 OF THE DATA LIST ARE USED AS
 0074   REF  48 LAST 371     15,2102  50 065 1           INDEX  ITEMP1             ADDRESSES OF THE DESIRED DATA.
 0075   REF   3 LAST 370     15,2103  53'404 1           DXCH   DNTMBUFF

 0076   REF  49 LAST 360     15,2104  3 7656 0           CAF    TWO
 0077   REF  49 LAST 371     15,2105  26 065 0           ADS    ITEMP1
 0078   REF  19 LAST 371     15,2106  10 066 0           CCS    ITEMP2
 0079   REF   1              15,2107  1 2074 1           TCF    LOOP

 0080   REF   1              15,2110  3 2220 0           CAF    DEC11              SET UP TO SEND 11 REMAINING WORDS
 0081   REF   1              15,2111  55'402 1           TS     TMINDEX
 0082   REF   1              15,2112  3 2213 0           CAF    LDNPHASX
 0083   REF   6 LAST 371     15,2113  55'401 1           TS     DNTMGOTO

 0084                        15,2114  0 0006 1           EXTEND
 0085   REF   3 LAST 371     15,2115  5 1400 1           INDEX  LDATALST
```

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L      DOWN-TELEMETRY PROGRAM                                                               USER'S OWN PAGE NO.   3

 0086                       15,2116  5 0045 0           INDEX  37D
 0087                       15,2117  3 0001 0           DCA    0
 0088  REF    1             15,2120  1 2146 1           TCF    DNTMEXIT

 0089  REF    2 LAST 371    15,2121  55'402 1  DNPHASXA TS     TMINDEX
 0090                       15,2122  0 0006 1           EXTEND
 0091  REF  235 LAST 371    15,2123  5 0000 1           INDEX  A                   SENDS SNAPSHOT BUFFER.
 0092  REF    1             15,2124  5 2230 1           INDEX  FIXLISTB
 0093                       15,2125  3 0001 0           DCA    0
 0094  REF    2 LAST 372    15,2126  1 2146 1           TCF    DNTMEXIT

 0095  REF    3 LAST 372    15,2127  11'402 1  DNPHASEX CCS    TMINDEX             AT END OF SNAPSHOT TRANSMISSION, SET UP
 0096  REF    1             15,2130  1 2121 0           TCF    DNPHASXA            TO SEND 26 PRS FROM ANY ERASABLE LOC AS

 0097  REF    1             15,2131  3 2214 1           CAF    LDNPHAS3            SPECIFIED BY WORDS 1 - 26 OF THE DATA
 0098  REF    7 LAST 371    15,2132  55'401 1           TS     DNTMGOTO            LIST.
 0099  REF    1             15,2133  3 2217 1           CAF    NOGENWDS

 0100  REF    4 LAST 372    15,2134  55'402 1  PHASE3A  TS     TMINDEX             GET DP WORD FROM ANY EBANK.
 0101  REF    4 LAST 371    15,2135  6 1400 1           AD     LDATALST
 0102                       15,2136  0 0006 1           EXTEND
 0103  REF  236 LAST 372    15,2137  5 0000 1           INDEX  A
 0104                       15,2140  3 0001 0           DCA    0                   THIS GETS THE ADDRESS - MUST USE DCA
 0105  REF   16 LAST 355    15,2141  54 003 0           TS     EBANK
 0106  REF    6 LAST 355    15,2142  7 5235 1           MASK   LOW8
 0107                       15,2143  0 0006 1           EXTEND
 0108  REF  237 LAST 372    15,2144  5 0000 1           INDEX  A
 0109                       15,2145  3 1401 0           DCA    3400                (NOTE ASSEMBLY AS DCA 1400)
 0110                       15,2146  0 0006 1  DNTMEXIT EXTEND                     GENERAL DNTM EXIT LOCATION.
 0111  REF    2 LAST 371    15,2147  01 034 1           WRITE  DNTM1
 0112  REF   91 LAST 369    15,2150  3 0001 0           CA     L
 0113                       15,2151  0 0006 1  TMEXITL  EXTEND
 0114  REF    1             15,2152  01 035 0           WRITE  DNTM2
 0115  REF    2 LAST  28    15,2153  1 4610 0           TCF    NOQRSM

 0116  REF    5 LAST 372    15,2154  11'402 1  DNPHASE3 CCS    TMINDEX
 0117  REF    1             15,2155  1 2134 1           TCF    PHASE3A

 0118  REF    1             15,2156  3 2215 0           CAF    LDNPHAS4            SEND FIXED FORMAT LIST OF DSPTAB AND
 0119  REF    8 LAST 372    15,2157  55'401 1           TS     DNTMGOTO            T2,T1.
 0120  REF   12 LAST 326    15,2160  3 6162 1           CAF    SIX

 0121  REF    6 LAST 372    15,2161  55'402 1  PHASE4A  TS     TMINDEX
 0122                       15,2162  0 0006 1           EXTEND                     FIXED DATA LIST FOR DSPTAB AND TIME.
 0123  REF  238 LAST 372    15,2163  5 0000 1           INDEX  A
 0124  REF    1             15,2164  5 2221 1           INDEX  FIXLIST
 0125                       15,2165  3 0001 0           DCA    0
 0126  REF    3 LAST 372    15,2166  1 2146 1           TCF    DNTMEXIT
```

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L       DOWN-TELEMETRY PROGRAM                                                             USER'S OWN PAGE NO.   4

 0127   REF    7 LAST 372       15,2167  11'402 1  DNPHASE4 CCS     TMINDEX
 0128   REF    1                15,2170   1 2161 1           TCF     PHASE4A

 0129   REF    1                15,2171   3 2216 0           CAF     LPHASE5               SET UP FOR CHANNEL TRANSMISSION.
 0130   REF    9 LAST 372       15,2172  55'401 1            TS      DNTMGOTO
 0131   REF   11 LAST 332       15,2173   3 6165 0           CAF     THREE                 FOUR PAIRS OF CHANNELS.

 0132   REF    8 LAST 373       15,2174  55'402 1  PHASE5A  TS      TMINDEX
 0133                           15,2175   0 0006 1           EXTEND
 0134   REF  239 LAST 372       15,2176   5 0000 1           INDEX   A
 0135   REF    1                15,2177   5 2247 1           INDEX   FIXLSTCL
 0136                           15,2200  00 000 1            READ    0
 0137   REF   92 LAST 372       15,2201  54 001 1            TS      L
 0138                           15,2202   0 0006 1           EXTEND
 0139   REF    9 LAST 373       15,2203   5 1402 0           INDEX   TMINDEX
 0140   REF    1                15,2204   5 2243 0           INDEX   FIXLSTCA
 0141                           15,2205  00 000 1            READ    0
 0142   REF    4 LAST 372       15,2206   1 2146 1           TCF     DNTMEXIT

 0143   REF   10 LAST 373       15,2207  11'402 1  DNPHASE5 CCS     TMINDEX
 0144   REF    1                15,2210   1 2174 0           TCF     PHASE5A
 0145   REF    2 LAST 158       15,2211   1 2052 0           TCF     DNPHASE1              START NEXT CYCLE.
```

```
P0146              CONSTNATS AND FIXED FORMAT DATA LIST.

 0147  REF   1                15,2212   02066 0  LDNPHAS2 ADRES   DNPHASE2
 0148  REF   1                15,2213   02127 1  LDNPHASX ADRES   DNPHASEX
 0149  REF   1                15,2214   02154 0  LDNPHAS3 ADRES   DNPHASE3
 0150  REF   1                15,2215   02167 0  LDNPHAS4 ADRES   DNPHASE4
 0151  REF   1                15,2216   02207 0  LPHASE5  ADRES   DNPHASE5

 0152                         15,2217   00031 0  NOGENWDS DEC     25              26 WORDS SENT DURING PHASE 3.
 0153                         15,2220   00013 0  DEC11    DEC     11

 0154  REF  11 LAST 370       15,2221   00024 1  FIXLIST  ADRES   TIME2           FIXED-FORMAT PORTION INCLUDES BUFFER,
 0155  REF  38 LAST 366       15,2222   00321 1           ADRES   DSPTAB +10D     DSPTAB, AND TIME.
 0156  REF  39 LAST 374       15,2223   00317 1           ADRES   DSPTAB +8D
 0157  REF  40 LAST 374       15,2224   00315 0           ADRES   DSPTAB +6
 0158  REF  41 LAST 374       15,2225   00313 0           ADRES   DSPTAB +4
 0159  REF  42 LAST 374       15,2226   00311 1           ADRES   DSPTAB +2
 0160  REF  43 LAST 374       15,2227   00307 0           ADRES   DSPTAB

 0161  REF   4 LAST 371       15,2230   01427 1  FIXLISTB ADRES   DNTMBUFF +20D
 0162  REF   5 LAST 374       15,2231   01425 0           ADRES   DNTMBUFF +18D
 0163  REF   6 LAST 374       15,2232   01423 0           ADRES   DNTMBUFF +16D
 0164  REF   7 LAST 374       15,2233   01421 1           ADRES   DNTMBUFF +14D
 0165  REF   8 LAST 374       15,2234   01417 1           ADRES   DNTMBUFF +12D
 0166  REF   9 LAST 374       15,2235   01415 0           ADRES   DNTMBUFF +10D
 0167  REF  10 LAST 374       15,2236   01413 0           ADRES   DNTMBUFF +8D
 0168  REF  11 LAST 374       15,2237   01411 1           ADRES   DNTMBUFF +6D
 0169  REF  12 LAST 374       15,2240   01407 0           ADRES   DNTMBUFF +4D
 0170  REF  13 LAST 374       15,2241   01405 1           ADRES   DNTMBUFF +2D
 0171  REF  14 LAST 374       15,2242   01403 1           ADRES   DNTMBUFF

 0172                         15,2243   00032 0  FIXLSTCA OCT     32              CHANNEL ADDRESSES.
 0173                         15,2244   00030 1           OCT     30
 0174                         15,2245   00013 0           OCT     13
 0175                         15,2246   00011 1           OCT     11

 0176                         15,2247   00033 1  FIXLSTCL OCT     33
 0177                         15,2250   00031 0           OCT     31
 0178                         15,2251   00014 1           OCT     14
 0179                         15,2252   00012 1           OCT     12
```

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P0180          SPECIAL DATA LIST FOR HIGH SPEED RADAR SAMPLING. TELEMETERS TABLE OF 12 MEASUREMENTS OF 5 WORDS EACH -
R0182   DATA IN WORDS 1 & 2, RR CDU ANGLES IN 3 & 4, AND TIME 1 IN 5.

 0183   REF    8 LAST 370     15,2253   00342 1  FSTRADTM ECADR   UPLOCK
 0184   REF    3 LAST 269     15,2254   03436 0           ECADR   RFAILCNT          COUNTS BAD SAMPLES.
 0185   REF   18 LAST 353     15,2255   03545 0           ECADR   RSTACK +70D
 0186   REF   19 LAST 375     15,2256   03543 0           ECADR   RSTACK +68D
 0187   REF   20 LAST 375     15,2257   03541 1           ECADR   RSTACK +66D
 0188   REF   21 LAST 375     15,2260   03537 0           ECADR   RSTACK +64D
 0189   REF   22 LAST 375     15,2261   03535 1           ECADR   RSTACK +62D
 0190   REF   23 LAST 375     15,2262   03533 1           ECADR   RSTACK +60D
 0191   REF   24 LAST 375     15,2263   03531 0           ECADR   RSTACK +58D
 0192   REF   25 LAST 375     15,2264   03527 1           ECADR   RSTACK +56D
 0193   REF   26 LAST 375     15,2265   03525 0           ECADR   RSTACK +54D
 0194   REF   27 LAST 375     15,2266   03523 0           ECADR   RSTACK +52D
 0195   REF   28 LAST 375     15,2267   03521 1           ECADR   RSTACK +50D
 0196   REF   29 LAST 375     15,2270   03517 1           ECADR   RSTACK +48D
 0197   REF   30 LAST 375     15,2271   03515 0           ECADR   RSTACK +46D
 0198   REF   31 LAST 375     15,2272   03513 0           ECADR   RSTACK +44D
 0199   REF   32 LAST 375     15,2273   03511 1           ECADR   RSTACK +42D
 0200   REF   33 LAST 375     15,2274   03507 0           ECADR   RSTACK +40D
 0201   REF   34 LAST 375     15,2275   03505 1           ECADR   RSTACK +38D
 0202   REF   35 LAST 375     15,2276   03503 1           ECADR   RSTACK +36D
 0203   REF   36 LAST 375     15,2277   03501 0           ECADR   RSTACK +34D
 0204   REF   37 LAST 375     15,2300   03477 0           ECADR   RSTACK +32D
 0205   REF   38 LAST 375     15,2301   03475 1           ECADR   RSTACK +30D
 0206   REF   39 LAST 375     15,2302   03473 1           ECADR   RSTACK +28D
 0207   REF   40 LAST 375     15,2303   03471 0           ECADR   RSTACK +26D
 0208   REF   41 LAST 375     15,2304   03467 1           ECADR   RSTACK +24D
 0209   REF   42 LAST 375     15,2305   01465 1           ADRES   RSTACK +22D
 0210   REF   43 LAST 375     15,2306   01463 1           ADRES   RSTACK +20D
 0211   REF   44 LAST 375     15,2307   01461 0           ADRES   RSTACK +18D
 0212   REF   45 LAST 375     15,2310   01457 0           ADRES   RSTACK +16D
 0213   REF   46 LAST 375     15,2311   01455 1           ADRES   RSTACK +14D
 0214   REF   47 LAST 375     15,2312   01453 1           ADRES   RSTACK +12D
 0215   REF   48 LAST 375     15,2313   01451 0           ADRES   RSTACK +10D
 0216   REF   49 LAST 375     15,2314   01447 1           ADRES   RSTACK +8D
 0217   REF   50 LAST 375     15,2315   01445 0           ADRES   RSTACK +6
 0218   REF   51 LAST 375     15,2316   01443 0           ADRES   RSTACK +4
 0219   REF   52 LAST 375     15,2317   01441 1           ADRES   RSTACK +2
 0220   REF   53 LAST 375     15,2320   01437 0           ADRES   RSTACK
```

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L        DOWN-TELEMETRY PROGRAM                                                      USER'S OWN PAGE NO.  7

P0221              NOMINAL AURORA DOWNLIST.

 0222    REF    9 LAST 375      15,2321    00342 1  NOMDNLST ECADR   UPLOCK
 0223    REF    1               15,2322    02634 1           ECADR   DATAPL +6
 0224    REF    2 LAST 376      15,2323    02632 1           ECADR   DATAPL +4
 0225    REF    3 LAST 376      15,2324    02630 0           ECADR   DATAPL +2
 0226    REF    4 LAST 376      15,2325    02626 1           ECADR   DATAPL
 0227    REF    2 LAST  24      15,2326    02650 0           ECADR   VLAUN +4
 0228    REF    3 LAST 376      15,2327    02644 0           ECADR   VLAUN
 0229    REF    1               15,2330    02634 1           ECADR   ANGX
 0230    REF    1               15,2331    02632 1           ECADR   ANGY
 0231    REF    1               15,2332    02626 1           ECADR   ANGZ
 0232    REF    2 LAST  24      15,2333    02624 0           ECADR   INTY
 0233    REF    1               15,2334    02576 1           ECADR   DRIFTT
 0234    REF    1               15,2335    02640 1           ECADR   DRIFTI
 0235    REF    1               15,2336    02636 0           ECADR   DRIFTO
 0236    REF   39 LAST 226      15,2337    00374 1           ECADR   MARKSTAT
 0237    REF    6 LAST 348      15,2340    00402 1           ECADR   THETAD +2
 0238    REF    7 LAST 376      15,2341    00400 0           ECADR   THETAD
 0239    REF   16 LAST 349      15,2342    00423 1           ECADR   TANG
 0240    REF    6 LAST 235      15,2343    00362 0           ECADR   LASTYCMD
 0241    REF    5 LAST 162      15,2344    00366 1           ECADR   LMPCMD
 0242    REF    2 LAST 153      15,2345    01362 1           ECADR   REDOCTR             INCLUDES FAILREG.
 0243    REF   20 LAST 277      15,2346    00063 1           ECADR   STATE +2
 0244    REF   21 LAST 376      15,2347    00061 0           ECADR   STATE
 0245    REF    9 LAST 349      15,2350    00035 1           ECADR   OPTY
 0246    REF    8 LAST 280      15,2351    00034 0           ECADR   CDUZ
 0247    REF   10 LAST 348      15,2352    00032 0           ECADR   CDUX
 0248    REF    4 LAST 349      15,2353    00360 1           ADRES   FORVEL
 0249    REF    4 LAST 353      15,2354    00355 1           ADRES   FINALT
 0250    REF   13 LAST 279      15,2355    00364 0           ADRES   ALTSAVE
 0251    REF    7 LAST 353      15,2356    00354 0           ADRES   ALTRATE
 0252    REF    7 LAST 353      15,2357    00352 0           ADRES   ALT
 0253    REF    5 LAST 256      15,2360    00421 0           ADRES   TIMEHOLD
 0254    REF    3 LAST 256      15,2361    00417 0           ADRES   OPTYHOLD
 0255    REF    7 LAST 256      15,2362    00415 1           ADRES   SAMPLSUM
 0256    REF    5 LAST 253      15,2363    00427 0           ADRES   OLDATAGD
 0257    REF   77 LAST 364      15,2364    00413 1           ADRES   RADMODES
 0258    REF    2 LAST 197      15,2365    00041 1           ADRES   PIPAZ
 0259    REF    3 LAST 348      15,2366    00037 0           ADRES   PIPAX
 0260                                      15,2367  ENDDNTMS EQUALS
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LINS    AGC BLOCK TWO SELF-CHECK                                                USER'S OWN PAGE NO.  1

0001                                 20,2000            BANK   20

0002   REF  32 LAST 363               7657    SBIT1     EQUALS BIT1
0003   REF  21 LAST 245               7656    SBIT2     EQUALS BIT2
0004   REF  15 LAST 368               7655    SBIT3     EQUALS BIT3
0005   REF  24 LAST 304               7654    SBIT4     EQUALS BIT4
0006   REF  13 LAST 368               7653    SBIT5     EQUALS BIT5
0007   REF  28 LAST 357               7652    SBIT6     EQUALS BIT6
0008   REF  24 LAST 371               7651    SBIT7     EQUALS BIT7
0009   REF  21 LAST 368               7650    SBIT8     EQUALS BIT8
0010   REF  11 LAST 368               7647    SBIT9     EQUALS BIT9
0011   REF  35 LAST 369               7646    SBIT10    EQUALS BIT10
0012   REF  26 LAST 368               7645    SBIT11    EQUALS BIT11
0013   REF  17 LAST 326               7644    SBIT12    EQUALS BIT12
0014   REF  21 LAST 273               7643    SBIT13    EQUALS BIT13
0015   REF  33 LAST 334               7642    SBIT14    EQUALS BIT14
0016   REF  31 LAST 368               7641    SBIT15    EQUALS BIT15

0017   REF 140 LAST 371               7665    S+ZERO    EQUALS ZERO
0018   REF  33 LAST 377               7657    S+1       EQUALS BIT1
0019   REF  22 LAST 377               7656    S+2       EQUALS BIT2
0020   REF  12 LAST 373               6165    S+3       EQUALS THREE
0021   REF  11 LAST 332               7655    S+4       EQUALS FOUR
0022   REF   7 LAST 338               7664    S+5       EQUALS FIVE
0023   REF  13 LAST 372               6162    S+6       EQUALS SIX
0024   REF   8 LAST 333               7663    S+7       EQUALS SEVEN
0025   REF   7 LAST 372               5235    S8BITS    EQUALS LOW8             00377
0026                       20,2000   00051 0  CNTRCON   OCTAL  00051            USED IN CNTRCHK
0027                       20,2001   00062 0  ERASCON1  OCTAL  00062            USED IN ERASCHK
0028                       20,2002   01374 0  ERASCON2  OCTAL  01374            USED IN ERASCHK
0029                       20,2003   01400 1  ERASCON6  OCTAL  01400            USED IN ERASCHK
0030                       20,2004   01462 0  ERASCON3  OCTAL  01462            USED IN ERASCHK
0031                       20,2005   01774 1  ERASCON4  OCTAL  01774            USED IN ERASCHK
0032   REF  18 LAST 371               6426    S10BITS   EQUALS LOW10            01777, USED IN ERASCHK
0033   REF   2 LAST 235               4506    SBNK03    EQUALS PRIO6            06000, USED IN ROPECHK
0034                       20,2006   17777 0  S13BITS   OCTAL  17777
0035                       20,2007   25252 0  CONC+S1   OCTAL  25252            USED IN CYCLSHFT
0036                       20,2010   37737 0  OVCON     OCTAL  37737            USED IN RUPTCHK
0037                       20,2011   37776 0  DVCON     OCTAL  37776
0040                       20,2012   52400 1  CONC+S2   OCTAL  52400            USED IN CYCLSHFT
0041                       20,2013   76777 1  ERASCON5  OCTAL  76777
0042                       20,2014   77770 1  S-7       OCTAL  77770
0043   REF   2 LAST  39               6045    S-4       EQUALS NEG4
0044   REF   2 LAST 203               7671    S-3       EQUALS NEG3
0045   REF   2 LAST 301               7670    S-2       EQUALS NEG2
0046   REF   6 LAST  90               7667    S-1       EQUALS NEGONE
0047   REF   2 LAST 163               7666    S-ZERO    EQUALS NEG0

0048                                    E3              EBANK= 3
0049   REF   1             20,2015   01371 0  ADRS1     ADRES  SKEEP1
```

```
 0050    REF  32 LAST 338   20,2016    00021 1  SRADRS    ADRES  SR
 00501   REF   3 LAST 158   20,2017    02101 0  SELFADRS  ADRES  SELFCHK         SELFCHK RETURN ADDRESS. SHOULD BE PUT
A00502                                                                           IN SELFRET WHEN GOING FROM SELFCHK TO
A00503                                                                           SHOWSUM AND PUT IN SKEEP1 WHEN GOING
A00504                                                                           FROM SHOWSUM TO SELF-CHECK.

 0051    REF 240 LAST 367   20,2020   3 0002 0  ERRORS    CA     Q
 0052    REF   4 LAST 367   20,2021   55'364 0            TS     SFAIL           SAVE Q FOR FAILURE LOCATION
 0053    REF   1            20,2022   25'365 0            INCR   ERCOUNT         KEEP TRACK OF NUMBER OF MALFUNCTIONS.
 0054    REF  25 LAST 254   20,2023   0 5413 1            TC     ALARM
 0055                       20,2024    01102 0            OCT    01102           SELF-CHECK MALFUNCTION INDICATOR
 0056    REF   3 LAST 348   20,2025   11'361 0            CCS    SMODE
 0057    REF   1            20,2026   3 7665 0            CA     S+ZERO
 0058    REF   4 LAST 378   20,2027   55'361 0            TS     SMODE
 0059    REF   4 LAST 378   20,2030   0 2101 0            TC     SELFCHK         GO TO IDLE LOOP
 0060    REF   5 LAST 378   20,2031   0 1364 1            TC     SFAIL           CONTINUE WITH SELF-CHECK

 0061    REF 240 LAST 373   20,2032   4 0000 0  +0CHK     CS     A
 0062    REF 241 LAST 378   20,2033   10 000 0  -0CHK     CCS    A
 0063    REF   1            20,2034   1 2020 0            TCF    ERRORS
 0064    REF   2 LAST 378   20,2035   1 2020 0            TCF    ERRORS
 0065    REF   3 LAST 378   20,2036   1 2020 0            TCF    ERRORS
 0066    REF 241 LAST 378   20,2037   0 0002 0            TC     Q

 0067    REF 242 LAST 378   20,2040   4 0000 0  +1CHK     CS     A
 0068    REF 243 LAST 378   20,2041   10 000 0  -1CHK     CCS    A
 0069    REF   4 LAST 378   20,2042   1 2020 0            TCF    ERRORS
 0070    REF   5 LAST 378   20,2043   1 2020 0            TCF    ERRORS
 0071    REF 244 LAST 378   20,2044   10 000 0            CCS    A
 0072    REF   6 LAST 378   20,2045   1 2020 0            TCF    ERRORS
 0073    REF 242 LAST 378   20,2046   0 0002 0            TC     Q

 0074                       20,2047   0 0006 1  SMODECHK  EXTEND
 0075    REF   2 LAST 377   20,2050   23'371 0            QXCH   SKEEP1
 0076    REF   2 LAST 137   20,2051   0 4457 0            TC     CHECKNJ         CHECK FOR NEW JOB
 0077    REF   5 LAST 378   20,2052   11'361 0            CCS    SMODE
 0078    REF   1            20,2053   0 2060 0            TC     SOPTIONS
 0079    REF   1            20,2054   0 2051 1            TC     SMODECHK +2     TO BACKUP IDLE LOOP
 0080    REF   2 LAST 378   20,2055   0 2060 0            TC     SOPTIONS
 00801   REF   1            20,2056   25'366 0            INCR   SCOUNT
 0081    REF   3 LAST 378   20,2057   0 1371 0            TC     SKEEP1          CONTINUE WITH SELF-CHECK

 0082    REF   1            20,2060   6 2014 0  SOPTIONS  AD     S-7
 0083                       20,2061   0 0006 1            EXTEND
 0084                       20,2062   6 2065 0            BZMF   +3              FOR OPTIONS BELOW NINE.
 0085    REF  20 LAST 364   20,2063   0 4102 0  BNKOPTN   TC     POSTJUMP        GO TO ANOTHER BANK FOR OPTIONS ABOVE 8.
 0086    REF   1            20,2064    03000 1            CADR   SBNKOPTN
 0087    REF   2 LAST 378   20,2065   25'366 0            INCR   SCOUNT          FOR OPTIONS BELOW NINE.
 0088    REF   1            20,2066   6 7663 0            AD     S+7
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LINS    AGC BLOCK TWO SELF-CHECK                                                      USER'S OWN PAGE NO.   3

 0089   REF 245 LAST 378     20,2067  50 000 1            INDEX  A
 0090   REF   1              20,2070  0 2071 0            TC     SOPTION1
 0091   REF   1              20,2071  0 2102 0  SOPTION1  TC     TC+TCF
 0092   REF   1              20,2072  0 2767 0  SOPTION2  TC     IN-OUT1
 0093   REF   1              20,2073  0 3043 0  SOPTION3  TC     COUNTCHK
 0094   REF   1              20,2074  0 3137 1  SOPTION4  TC     ERASCHK
 0095   REF   1              20,2075  0 3307 0  SOPTION5  TC     ROPECHK
 0096   REF   1              20,2076  0 3516 0  SOPTION6  TC     MPNMBRS
 0097   REF   1              20,2077  0 3605 1  SOPTION7  TC     DVCHECK
 0098   REF   4 LAST 378     20,2100  0 1371 0  SOPTON10  TC     SKEEP1             CONTINUE WITH SELF-CHECK

 0099   REF   2 LAST 378     20,2101  0 2047 0  SELFCHK   TC     SMODECHK           ** CHARLEY, COME IN HERE

R0100   TC+TCF CHECKS ALL OF THE PULSES OF TCF AND ALL OF THE PULSES OF TC
R0101   EXCEPT ABILITY TO TC TO ERASABLE.
R0102   ALSO FIRST TIME CS FIXED MEMORY IS USED
 0103                        20,2102  0 2104 0  TC+TCF    TC     +2
 0104   REF   1              20,2103  0 2111 1            TC     CCSCHK
 0105                        20,2104  1 2106 0            TCF    +2                 $ TCF FIXED MEMORY
 0106   REF   7 LAST 378     20,2105  0 2020 1            TC     ERRORS
 0107   REF   1              20,2106  4 6165 1            CS     S+3                $ CS FIXED MEMORY
 0108   REF 243 LAST 378     20,2107  0 0002 0            TC     Q                  $
 0109   REF   8 LAST 379     20,2110  0 2020 1            TC     ERRORS

R0110   CCSCHK CHECKS ALL OF CCS EXCEPT RB WG.
R0111   ALSO CHECKS TS ERASABLE, CS SC, AND CS ERASABLE MEMORY.
 0112   REF 246 LAST 379     20,2111  10 000 0  CCSCHK    CCS    A                  $ CCS SC, C(A) = -3
 0113   REF   9 LAST 379     20,2112  0 2020 1            TC     ERRORS
 0114   REF  10 LAST 379     20,2113  0 2020 1            TC     ERRORS
 0115                        20,2114  0 2116 0            TC     +2
 0116   REF  11 LAST 379     20,2115  0 2020 1            TC     ERRORS
 0117   REF 247 LAST 379     20,2116  10 000 0            CCS    A                  $ C(A) = +2, RESULT OF CCS -NUMBER
 0118                        20,2117  0 2123 0            TC     +4
 0119   REF  12 LAST 379     20,2120  0 2020 1            TC     ERRORS
 0120   REF  13 LAST 379     20,2121  0 2020 1            TC     ERRORS
 0121   REF  14 LAST 379     20,2122  0 2020 1            TC     ERRORS
 0122   REF   5 LAST 379     20,2123  55'371 1            TS     SKEEP1             $ TS ERASABLE
 0123   REF   6 LAST 379     20,2124  11'371 1            CCS    SKEEP1             $ CCS ERASABLE, C(A) = +1, RESULT OF
 0124                        20,2125  0 2131 0            TC     +4                 CCS +NUMBER
 0125   REF  15 LAST 379     20,2126  0 2020 1            TC     ERRORS
 0126   REF  16 LAST 379     20,2127  0 2020 1            TC     ERRORS
 0127   REF  17 LAST 379     20,2130  0 2020 1            TC     ERRORS
 0128   REF 248 LAST 379     20,2131  10 000 0            CCS    A                  $ C(A) = +0, RESULT OF CCS +1, CHECKS CI
 0129   REF  18 LAST 379     20,2132  0 2020 1            TC     ERRORS
 0130                        20,2133  0 2136 1            TC     +3
 0131   REF  19 LAST 379     20,2134  0 2020 1            TC     ERRORS
 0132   REF  20 LAST 379     20,2135  0 2020 1            TC     ERRORS
 0133   REF 249 LAST 379     20,2136  4 0000 0            CS     A                  $ CS SC
 0134   REF 250 LAST 379     20,2137  10 000 0            CCS    A                  $ C(A) = -0, RESULT OF CCS +0
 0135   REF  21 LAST 379     20,2140  0 2020 1            TC     ERRORS
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LINS    AGC BLOCK TWO SELF-CHECK                                                    USER'S OWN PAGE NO.   4

 0136   REF  22 LAST 379     20,2141  0 2020 1             TC       ERRORS
 0137   REF  23 LAST 380     20,2142  0 2020 1             TC       ERRORS
 0138   REF 251 LAST 379     20,2143  10 000 0             CCS      A              $ RESULT OF CCS -0
 0139   REF  24 LAST 380     20,2144  0 2020 1             TC       ERRORS
 0140                        20,2145  0 2150 1             TC       +3
 0141   REF  25 LAST 380     20,2146  0 2020 1             TC       ERRORS
 0142   REF  26 LAST 380     20,2147  0 2020 1             TC       ERRORS
 0143   REF   7 LAST 379     20,2150  4 1371 1             CS       SKEEP1         $ CS ERASABLE. ALSO CHECKS BACK INTO
 0144   REF   1              20,2151  0 2041 0             TC       -1CHK          ERASABLE SEQUENCE.

R0145   BZMFCHK CHECKS ALL PULSES OF BZMF.
R0146   ALSO CHECKS CA FIXED MEMORY.
 0147   REF   1              20,2152  3 7647 0  BZMFCHK    CAF      SBIT9          $ CA FIXED MEMORY
 0148                        20,2153  0 0006 1             EXTEND
 0149   REF   1              20,2154  6 2175 0             BZMF     ERRBZMF
 0150   REF 252 LAST 380     20,2155  4 0000 0             CS       A
 0151                        20,2156  0 0006 1             EXTEND
 0152                        20,2157  6 2161 0             BZMF     +2             $
 0153   REF  27 LAST 380     20,2160  0 2020 1             TC       ERRORS
 0154   REF   1              20,2161  3 3431 1             CA       S+MAX
 0155   REF   1              20,2162  6 7657 1             AD       S+1
 0156                        20,2163  0 0006 1             EXTEND
 0157   REF   1              20,2164  6 2176 0             BZMF     ERRBZMF2       $ + OVERFLOW, CHECK 01-0000
 0158   REF   2 LAST 378     20,2165  3 7665 0             CA       S+ZERO
 0159                        20,2166  0 0006 1             EXTEND
 0160                        20,2167  6 2171 1             BZMF     +2             $
 0161   REF  28 LAST 380     20,2170  0 2020 1             TC       ERRORS
 0162   REF 253 LAST 380     20,2171  4 0000 0             CS       A
 0163                        20,2172  0 0006 1             EXTEND
 0164                        20,2173  6 2177 1             BZMF     +4             $
 0165   REF  29 LAST 380     20,2174  0 2020 1             TC       ERRORS
 0166   REF  30 LAST 380     20,2175  0 2020 1  ERRBZMF    TC       ERRORS         FROM BZMF WITH +NON-ZERO
 0167   REF  31 LAST 380     20,2176  0 2020 1  ERRBZMF2   TC       ERRORS         OVERFLOW WITH +0

R0168   RESTORE1 AND 2 CHECKS INSTRUCTIONS (WITH STAR) ABILITY TO READ BACK INTO
R0169   ERASABLE MEMORY. NOT NORMALLY INTERESTED IN CONTENTS OF A REGISTER.
R0170   FIRST TIME MANY INSTRUCTIONS ARE USED.
R0171   RESTORE1 ALSO CHECKS INDEX (WITHOUT EXTRACODE) ERASABLE, CA ERASABLE,
R0172   AND MASK ERASABLE.
 0173   REF   1              20,2177  3 2016 1  RESTORE1   CAF      SRADRS         ADDRESS OF SR
 0174   REF   1              20,2200  55'377 1             TS       SKEEP7
 0175   REF   1              20,2201  3 5235 0             CA       S8BITS         00377
 0176   REF   2 LAST 380     20,2202  51'377 0             NDX      SKEEP7         $ INDEX ERASABLE                    *
 0177                        20,2203  54 000 0             TS       0000           TS SR, C(SR) = 00177
 0178   REF  33 LAST 378     20,2204  10 021 0             CCS      SR             C(SR) = 00077                       *
 0179   REF   3 LAST 380     20,2205  51'377 0             NDX      SKEEP7         CHECKS C(SKEEP7) CORRECT
 0180                        20,2206  4 0000 0             CS       0000           C(SR) = 00037
 0181   REF  34 LAST 380     20,2207  6 0021 1             AD       SR             C(SR) = 00017                       *
 0182                        20,2210  0 0006 1             EXTEND
 0183   REF  35 LAST 380     20,2211  20 021 0             MSU      SR             C(SR) = 00007                       *
 0184                       20,2212  0 0006 1           EXTEND
 0185  REF  36 LAST 380     20,2213  60 021 1           SU      SR          C(SR) = 00003                               *
 0186  REF  37 LAST 381     20,2214  3 0021 1           CA      SR          $ C(SR) = +1, C(A) = +3, CA ERASABLE        *
 0187  REF  38 LAST 381     20,2215  7 0021 0           MASK    SR          $ B(SR) = C(SR) = +1, MASK ERASABLE         *
 0188  REF   1              20,2216  0 2040 1           TC      +1CHK
 0189                       20,2217  0 0006 1           EXTEND
 0190  REF  39 LAST 381     20,2220  7 0021 0           MP      SR
 0191                       20,2221  0 0006 1           EXTEND
 0192  REF  40 LAST 381     20,2222  10 021 0           DV      SR
 0193  REF  41 LAST 381     20,2223  3 0021 1           CA      SR          $ CA ERASABLE
 0194  REF   2 LAST 381     20,2224  0 2040 1           TC      +1CHK       MAKES SURE MASK, MP, AND DV DO NOT EDIT.

R0195  RESTORE2 ALSO CHECKS XCH ERASABLE,INDEX (WITH EXTRACODE) ERASABLE AND
R0196  FIXED MEMORY, DCS ERASABLE, CA SC, AND DCA ERASABLE.
 0197  REF   1              20,2225  3 2015 1  RESTORE2 CAF     ADRS1       ADDRESS OF SKEEP1
 0198  REF   1              20,2226  55'376 0           TS      SKEEP6
 0199  REF   1              20,2227  3 7667 1           CA      S-1
 0200  REF   8 LAST 380     20,2230  55'371 1           TS      SKEEP1      -1
 0201  REF 254 LAST 380     20,2231  4 0000 0           CS      A
 0202  REF   9 LAST 381     20,2232  57'371 0           XCH     SKEEP1      $ XCH ERASABLE, C(SKEEP1) = +1
 0203  REF   1              20,2233  57'372 0           XCH     SKEEP2      $ XCH ERASABLE, C(SKEEP2) = -1
 0204                       20,2234  0 0006 1           EXTEND
 0205  REF   2 LAST 381     20,2235  5 1376 1           NDX     SKEEP6      $ NDX ERASABLE                              *
 0206                       20,2236  3 0001 0           DCA     0000        DCA ERASABLE                                *
 0207                       20,2237  0 0006 1           EXTEND
 0208  REF   2 LAST 381     20,2240  5 2015 1           NDX     ADRS1       $ NDX FIXED MEMORY                          *
 0209                       20,2241  4 0001 1           DCS     0000        $ DCS ERASABLE MEMORY                       *
 0210  REF   2 LAST 380     20,2242  0 2041 0           TC      -1CHK       MAKES SURE DCS ERASABLE OK
 0211  REF  93 LAST 373     20,2243  3 0001 0           CA      L           $ CA SC
 0212  REF   3 LAST 381     20,2244  0 2040 1           TC      +1CHK
 0213                       20,2245  0 0006 1           EXTEND
 0214  REF   3 LAST 381     20,2246  5 1376 1           NDX     SKEEP6      MAKE SURE C(SKEEP6) IS STILL CORRECT
 0215                       20,2247  3 0001 0           DCA     0000        $ DCA ERASABLE
 0216  REF   4 LAST 381     20,2250  0 2040 1           TC      +1CHK
 0217  REF  94 LAST 381     20,2251  3 0001 0           CA      L
 0218  REF   3 LAST 381     20,2252  0 2041 0           TC      -1CHK

R0219  RESTORE3 CHECKS ABILITY TO RESTORE INSTRUCTIONS BACK INTO ERASABLE
R0220  MEMORY. IT IS ONLY NECESSARY TO RESTORE ONE INSTRUCTION BECAUSE THE
R0221  G REGISTER DOES NOT CHANGE.
R0222  ALSO CHECKS TC TO ERASABLE MEMORY.
 0223  REF   1              20,2253  3 7641 0  RESTORE3 CA      SBIT15      CS
 0224  REF  10 LAST 381     20,2254  55'371 1           TS      SKEEP1      40000
 0225  REF   1              20,2255  3 7656 0           CA      S+2         TC Q
 0226  REF   2 LAST 381     20,2256  55'372 1           TS      SKEEP2
 0227  REF   2 LAST 380     20,2257  3 7657 1           CA      S+1         +1
 0228  REF  11 LAST 381     20,2260  0 1371 0           TC      SKEEP1      $ TC ERASABLE
 0229  REF   4 LAST 381     20,2261  0 2041 0           TC      -1CHK       FIRST TIME BACK FROM ERASABLE.
 0230  REF  12 LAST 381     20,2262  0 1371 0           TC      SKEEP1
 0231  REF   1              20,2263  0 2033 0           TC      -0CHK       SECOND TIME BACK FROM ERASABLE.
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R0232    BZFCHK CHECKS ALL PULSES OF BZF.
 0233    REF   1               20,2264  3 7664 1  BZFCHK    CAF     S+5
 0234                          20,2265  0 0006 1            EXTEND
 0235    REF   1               20,2266  1 2311 1            BZF     ERRBZF1           $
 0236    REF 255 LAST 381      20,2267  4 0000 0            CS      A
 0237                          20,2270  0 0006 1            EXTEND
 0238    REF   1               20,2271  1 2312 1            BZF     ERRBZF2           $
 0239    REF   2 LAST 380      20,2272  3 3431 1            CA      S+MAX
 0240    REF   3 LAST 381      20,2273  6 7657 1            AD      S+1               01-00000
 0241                          20,2274  0 0006 1            EXTEND
 0242    REF   1               20,2275  1 2313 0            BZF     ERRBZF3           $
 0243    REF 256 LAST 382      20,2276  4 0000 0            CS      A
 0244                          20,2277  0 0006 1            EXTEND
 0245    REF   1               20,2300  1 2314 1            BZF     ERRBZF4           $
 0246    REF   3 LAST 380      20,2301  3 7665 0            CAF     S+ZERO
 0247                          20,2302  0 0006 1            EXTEND
 0248                          20,2303  1 2305 1            BZF     +2                $
 0249    REF  32 LAST 380      20,2304  0 2020 1            TC      ERRORS
 0250    REF 257 LAST 382      20,2305  4 0000 0            CS      A
 0251                          20,2306  0 0006 1            EXTEND
 0252                          20,2307  1 2315 0            BZF     +6                $
 0253    REF  33 LAST 382      20,2310  0 2020 1            TC      ERRORS
 0254    REF  34 LAST 382      20,2311  0 2020 1  ERRBZF1   TC      ERRORS            +NON-ZERO
 0255    REF  35 LAST 382      20,2312  0 2020 1  ERRBZF2   TC      ERRORS            -NON-ZERO
 0256    REF  36 LAST 382      20,2313  0 2020 1  ERRBZF3   TC      ERRORS            01-00000
 0257    REF  37 LAST 382      20,2314  0 2020 1  ERRBZF4   TC      ERRORS            10-37777

R0258    DXCH+DIM CHECKS ALL PULSES OF DXCH AND DIM.
R0259    ALSO CHECKS TS WITH OVERFLOW, TS SC, CA SC, AND AD ERASABLE.
 0260    REF   3 LAST 382      20,2315  3 3431 1  DXCH+DIM  CA      S+MAX
 0261    REF   2 LAST 381      20,2316  6 7656 0            AD      S+2               OVERFLOW WITH +1
 0262    REF  13 LAST 381      20,2317  55'371 1            TS      SKEEP1            $ TS WITH OVERFLOW, +1
 0263    REF  38 LAST 382      20,2320  0 2020 1            TC      ERRORS
 0264    REF 258 LAST 382      20,2321  4 0000 0            CS      A
 0265    REF   3 LAST 381      20,2322  55'372 1            TS      SKEEP2
 0266    REF   4 LAST 382      20,2323  4 3431 0            CS      S+MAX
 0267    REF  95 LAST 381      20,2324  54 001 1            TS      L                 $ TS SC,  40000
 0268    REF 259 LAST 382      20,2325  4 0000 0            CS      A                 37777
 0269    REF  14 LAST 382      20,2326  53'372 1            DXCH    SKEEP1            $ DXCH ERASABLE
 0270    REF   5 LAST 381      20,2327  0 2040 1            TC      +1CHK
 0271    REF  96 LAST 382      20,2330  3 0001 0            CA      L                 $ CA SC
 0272    REF   5 LAST 381      20,2331  0 2041 0            TC      -1CHK
 0273                          20,2332  0 0006 1            EXTEND
 0274    REF  15 LAST 382      20,2333  27'371 1            DIM     SKEEP1            $ DIM ERASABLE, DIM + NUMBER, 37776
 0275                          20,2334  0 0006 1            EXTEND
 0276    REF   4 LAST 382      20,2335  27'372 1            DIM     SKEEP2            $ DIM - NUMBER, 40001
 0277    REF   5 LAST 382      20,2336  3 3431 1            CA      S+MAX             37777
 0278    REF   5 LAST 382      20,2337  6 1372 0            AD      SKEEP2            $ AD ERASABLE, +1
 0279    REF   6 LAST 382      20,2340  0 2040 1            TC      +1CHK
 0280    REF   6 LAST 382      20,2341  4 3431 0            CS      S+MAX             40000
 0281   REF  16 LAST 382    20,2342  6 1371 0             AD      SKEEP1         -1
 0282   REF   6 LAST 382    20,2343  0 2041 0             TC      -1CHK
 0283   REF   4 LAST 382    20,2344  3 7657 1             CA      S+1            +1
 0284                       20,2345  0 0006 1             EXTEND
 0285   REF 260 LAST 382    20,2346  26 000 0             DIM     A              $ DIM SC, DIM +1
 0286                       20,2347  0 0006 1             EXTEND
 0287   REF 261 LAST 383    20,2350  26 000 0             DIM     A              $ DIM -0
 0288   REF   2 LAST 381    20,2351  0 2033 0             TC      -0CHK
 0289                       20,2352  0 0006 1             EXTEND
 0290   REF 262 LAST 383    20,2353  26 000 0             DIM     A              $ DIM +0
 0291   REF   1             20,2354  0 2032 1             TC      +0CHK

R0292   DAS+INCR CHECKS ALL PULSES OF DAS AND INCR.
R0293   ALSO CHECKS DCA FIXED, LXCH SC, DCA ERASABLE, AD ERASABLE, DCS FIXED,
R0294   DCS ERASABLE, AND XCH SC.
 0295   REF   2 LAST 381    20,2355  3 7667 1  DAS+INCR   CA      S-1
 0296   REF  97 LAST 382    20,2356  54 001 1  DAS++      TS      L              -1
 0297   REF   3 LAST 382    20,2357  3 7656 0             CA      S+2            +2
 0298   REF 263 LAST 383    20,2360  20 001 1             DAS     A              $ DAS SC, C(A) = +4 AND C(L) = -2
 0299   REF   1             20,2361  6 7671 0             AD      S-3            $ AD FIXED MEMORY
 0300   REF   7 LAST 382    20,2362  0 2040 1             TC      +1CHK
 0301   REF   5 LAST 383    20,2363  3 7657 1             CA      S+1
 0302   REF  98 LAST 383    20,2364  6 0001 0             AD      L              $ AD SC, -1
 0303   REF   7 LAST 383    20,2365  0 2041 0             TC      -1CHK
R0304   DAS WITH INTERFLOW IN LOW ORDER AND NET OVERFLOW
 0305                       20,2366  0 0006 1  DAS+-      EXTEND
 0306   REF   7 LAST 382    20,2367  3 3432 1             DCA     S+MAX          $DCA FIXED MEMORY
 0307   REF   1             20,2370  53'374 1             DXCH    SKEEP3         37777, 40000
 0308   REF   1             20,2371  3 7670 1             CA      S-2
 0309   REF  99 LAST 383    20,2372  54 001 1             TS      L
 0310   REF   2 LAST 379    20,2373  3 6165 0             CA      S+3            C(A) = +3, C(L) = -2
 0311   REF   2 LAST 383    20,2374  21'374 1             DAS     SKEEP3         $ DAS ERASABLE
 0312   REF 264 LAST 383    20,2375  22 000 1             LXCH    A              $ LXCH SC
 0313   REF   2 LAST 383    20,2376  0 2032 1             TC      +0CHK
 0314   REF 100 LAST 383    20,2377  3 0001 0             CA      L
 0315   REF   8 LAST 383    20,2400  0 2040 1             TC      +1CHK
 0316                       20,2401  0 0006 1             EXTEND
 0317   REF   3 LAST 383    20,2402  3 1374 0             DCA     SKEEP3         $ DCA ERASABLE
 0318   REF 265 LAST 383    20,2403  22 000 1             LXCH    A              C(A) = -1, C(L) = +1
 0319   REF   8 LAST 383    20,2404  0 2041 0             TC      -1CHK
 0320   REF 101 LAST 383    20,2405  3 0001 0             CA      L
 0321   REF   9 LAST 383    20,2406  0 2040 1             TC      +1CHK
R0322   INCRCHK CHECKS ALL INCR PULSES EXCEPT WOVR.
 0323   REF   1             20,2407  25'374 0  INCRCHK    INCR    SKEEP4         $ INCR ERASABLE, -0
 0324   REF   2 LAST 383    20,2410  6 1374 0             AD      SKEEP4         $ AD ERASABLE
 0325   REF   3 LAST 383    20,2411  0 2033 0             TC      -0CHK
 0326   REF 266 LAST 383    20,2412  24 000 1             INCR    A              $ INCR SC, +1
 0327   REF  10 LAST 383    20,2413  0 2040 1             TC      +1CHK
R0328   DAS WITH OVERFLOW IN LOW ORDER AND NET UNDERFLOW
 0329                       20,2414  0 0006 1  DAS-+      EXTEND
 0330   REF   8 LAST 383      20,2415  4 3432 0          DCS     S+MAX          $ DCS FIXED MEMORY
 0331   REF  17 LAST 383      20,2416  53'372 1          DXCH    SKEEP1         40000, 37777
 0332   REF   3 LAST 383      20,2417  3 6165 0          CA      S+3            +3
 0333   REF 102 LAST 383      20,2420  54 001 1          TS      L
 0334   REF 267 LAST 383      20,2421  4 0000 0          CS      A              -3
 0335   REF  18 LAST 384      20,2422  21'372 1          DAS     SKEEP1         $
 0336   REF   9 LAST 383      20,2423  0 2041 0          TC      -1CHK
 0337                         20,2424  0 0006 1          EXTEND
 0338   REF  19 LAST 384      20,2425  4 1372 1          DCS     SKEEP1         $ DCS ERASABLE (+1, -2)
 0339   REF 103 LAST 384      20,2426  56 001 0          XCH     L              $ XCH SC (-2, +1)
 0340   REF   6 LAST 383      20,2427  6 7657 1          AD      S+1
 0341   REF  10 LAST 384      20,2430  0 2041 0          TC      -1CHK
 0342   REF 104 LAST 384      20,2431  3 0001 0          CA      L
 0343   REF  11 LAST 383      20,2432  0 2040 1          TC      +1CHK

R0344   MPCHK CHECKS ALL PULSES OF MP, AUG, AND ADS.
 0345   REF   7 LAST 384      20,2433  3 7657 1  MPCHK   CA      S+1
 0346                         20,2434  0 0006 1          EXTEND
 0347   REF 268 LAST 384      20,2435  24 000 1          AUG     A              $ AUG SC, +2
 0348   REF   1               20,2436  55'375 0          TS      SKEEP5         +2
 0349   REF 269 LAST 384      20,2437  4 0000 0          CS      A
 0350   REF 244 LAST 379      20,2440  54 002 1          TS      Q              -2
 0351   REF 270 LAST 384      20,2441  4 0000 0          CS      A
 0352                         20,2442  0 0006 1  MP++    EXTEND
 0353   REF   9 LAST 384      20,2443  7 3431 0          MP      S+MAX          $ MP FIXED MEMORY, +1, 37776
 0354   REF 105 LAST 384      20,2444  6 0001 0          AD      L              37777
 0355                         20,2445  0 0006 1  MP+-    EXTEND
 0356   REF 245 LAST 384      20,2446  7 0002 1          MP      Q              $ MP SC, -1, 40001
 0357   REF 106 LAST 384      20,2447  26 001 1          ADS     L              $ ADS SC, 40000
 0358   REF   1               20,2450  6 2011 0          AD      DVCON
 0359   REF  11 LAST 384      20,2451  0 2041 0          TC      -1CHK
 0360   REF 107 LAST 384      20,2452  3 0001 0          CA      L
 0361                         20,2453  0 0006 1  MP-+    EXTEND
 0362   REF   2 LAST 384      20,2454  7 1375 0          MP      SKEEP5         $ MP ERASABLE, -1, 40001
 0363   REF   4 LAST 381      20,2455  55'376 0          TS      SKEEP6
 0364                         20,2456  0 0006 1          EXTEND
 0365   REF   5 LAST 384      20,2457  25'376 1          AUG     SKEEP6         $ AUG ERASABLE, -2
 0366   REF 108 LAST 384      20,2460  6 0001 0          AD      L              40000
 0367                         20,2461  0 0006 1  MP--    EXTEND
 0368   REF   6 LAST 384      20,2462  7 1376 0          MP      SKEEP6         $ +1, 37776
 0369   REF  12 LAST 384      20,2463  0 2040 1          TC      +1CHK
 0370   REF 109 LAST 384      20,2464  4 0001 1          CS      L              40001
 0371   REF   2 LAST 384      20,2465  6 2011 0          AD      DVCON
 0372   REF   4 LAST 383      20,2466  0 2033 0          TC      -0CHK
 0373   REF   8 LAST 384      20,2467  3 7657 1          CA      S+1
 0374   REF   7 LAST 384      20,2470  27'376 0          ADS     SKEEP6         $ ADS ERASABLE, +1
 0375   REF  12 LAST 384      20,2471  0 2041 0          TC      -1CHK
 0376   REF   8 LAST 384      20,2472  3 1376 1          CA      SKEEP6
 0377   REF  13 LAST 384      20,2473  0 2041 0          TC      -1CHK
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R0378   DVCH AND DVQXCHK CHECK ALL OF PULSES OF DV AND QXCH.
R0379   ALSO CHECKS TS WITH UNDERFLOW
 0380   REF   1              20,2474  3 7642 0  DVCHK     CA       SBIT14          20000
 0381   REF  20 LAST 384     20,2475  55'371 1            TS       SKEEP1
 0382   REF 271 LAST 384     20,2476  6 0000 1            AD       A               OVERFLOW
 0383   REF   9 LAST 384     20,2477  6 7657 1            AD       S+1
 0384   REF 110 LAST 384     20,2500  54 001 1            TS       L               $ TS SC WITH OVERFLOW, +1
 0385   REF  39 LAST 382     20,2501  0 2020 1            TC       ERRORS
 0386   REF 272 LAST 385     20,2502  4 0000 0            CS       A
 0387   REF   6 LAST 382     20,2503  55'372 1            TS       SKEEP2          -1
 0388   REF   1              20,2504  3 7666 0            CA       S-ZERO          -0
 0389   REF  21 LAST 385     20,2505  23'371 0            LXCH     SKEEP1          $ LXCH ERASABLE
 0390                        20,2506  0 0006 1  DV++      EXTEND
 0391   REF  22 LAST 385     20,2507  11'371 1            DV       SKEEP1          $ DV ERASABLE, C(A) = 20000, C(L) = +0
 0392   REF 273 LAST 385     20,2510  4 0000 0            CS       A
 0393   REF 274 LAST 385     20,2511  22 000 1            LXCH     A
 0394   REF   3 LAST 383     20,2512  0 2032 1            TC       +0CHK
 0395                        20,2513  0 0006 1  DV--      EXTEND
 0396   REF   7 LAST 385     20,2514  11'372 1            DV       SKEEP2          $ 20000, +0
 0397   REF   3 LAST 383     20,2515  55'374 1            TS       SKEEP4          20000
 0398   REF 275 LAST 385     20,2516  4 0000 0            CS       A
 0399   REF   4 LAST 383     20,2517  55'373 0            TS       SKEEP3          -(20000)
 0400   REF   2 LAST 385     20,2520  6 7642 0            AD       SBIT14
 0401   REF   5 LAST 384     20,2521  0 2033 0            TC       -0CHK
 0402   REF 111 LAST 385     20,2522  3 0001 0            CA       L
 0403   REF   6 LAST 385     20,2523  0 2033 0            TC       -0CHK
 0404   REF  10 LAST 384     20,2524  3 3431 1  DV+-      CA       S+MAX
 0405   REF 112 LAST 385     20,2525  54 001 1            TS       L
 0406   REF   1              20,2526  3 2006 0            CA       S13BITS
 0407                        20,2527  0 0006 1            EXTEND
 0408   REF   5 LAST 385     20,2530  11'373 0            DV       SKEEP3          $ -(37777), +(17777)
 0409   REF 113 LAST 385     20,2531  56 001 0            XCH      L
 0410   REF 276 LAST 385     20,2532  4 0000 0            CS       A
 0411                        20,2533  0 0006 1  DV-+      EXTEND
 0412   REF   4 LAST 385     20,2534  11'374 1            DV       SKEEP4          $ -(37777), -(17777)
 0413   REF   3 LAST 384     20,2535  6 2011 0            AD       DVCON
 0414   REF  14 LAST 384     20,2536  0 2041 0            TC       -1CHK
 0415   REF  11 LAST 385     20,2537  3 3431 1            CA       S+MAX
 0416   REF 114 LAST 385     20,2540  56 001 0            XCH      L               ALSO PUTS 37777 IN L FOR DV-+,-
 0417   REF   3 LAST 385     20,2541  6 7642 0            AD       SBIT14
 0418   REF  13 LAST 384     20,2542  0 2040 1            TC       +1CHK
 0419   REF   2 LAST 385     20,2543  4 2006 1  DV-+,+    CS       S13BITS         -(17777)
 0420                        20,2544  0 0006 1            EXTEND
 0421   REF   5 LAST 385     20,2545  11'374 1            DV       SKEEP4
 0422   REF 115 LAST 385     20,2546  6 0001 0            AD       L               -(37775)
 0423   REF   4 LAST 385     20,2547  6 2011 0            AD       DVCON
 0424   REF  14 LAST 385     20,2550  0 2040 1            TC       +1CHK
 0425   REF 116 LAST 385     20,2551  56 001 0            XCH      L
 0426   REF  15 LAST 385     20,2552  0 2041 0            TC       -1CHK           ALSO PUTS +0 IN L FOR DVQXCH
 0427   REF   5 LAST 385     20,2553  4 2011 1  DVQXCHK   CS       DVCON
 0428   REF 246 LAST 384      20,2554  54 002 1             TS      Q            40001
 0429   REF 277 LAST 385      20,2555  4 0000 0             CS      A
 0430                         20,2556  0 0006 1             EXTEND
 0431   REF 247 LAST 386      20,2557  10 002 1             DV      Q            $ DV SC, -(37777), +(37776)
 0432                         20,2560  0 0006 1             EXTEND
 0433   REF 117 LAST 385      20,2561  22 001 0             QXCH    L            $ QXCH SC, C(L) = 40001, C(Q) = 37776
 0434   REF 248 LAST 386      20,2562  6 0002 0             AD      Q
 0435   REF  16 LAST 385      20,2563  0 2041 0             TC      -1CHK
 0436   REF 118 LAST 386      20,2564  3 0001 0             CA      L
 0437   REF  12 LAST 385      20,2565  6 3431 1             AD      S+MAX
 0438   REF  15 LAST 385      20,2566  0 2040 1             TC      +1CHK
 0439                         20,2567  0 0006 1             EXTEND
 0440   REF  23 LAST 385      20,2570  23'371 0             QXCH    SKEEP1       $ QXCH ERAS., C(Q) = +1, C(SKEEP1) = +3
 0441   REF 249 LAST 386      20,2571  3 0002 0             CA      Q
 0442   REF  16 LAST 386      20,2572  0 2040 1             TC      +1CHK
 0443   REF  24 LAST 386      20,2573  4 1371 1             CS      SKEEP1       -3
 0444   REF   4 LAST 383      20,2574  6 7656 0             AD      S+2
 0445   REF  17 LAST 386      20,2575  0 2041 0             TC      -1CHK

R0446   MSUCHK CHECKS ALL PULSES OF MSU EXCEPT RB WG.
 0447   REF   4 LAST 382      20,2576  3 7665 0  MSUCHK     CA      S+ZERO
 0448   REF  25 LAST 386      20,2577  55'371 1             TS      SKEEP1       +0
 0449   REF 278 LAST 386      20,2600  4 0000 0             CS      A
 0450   REF   8 LAST 385      20,2601  55'372 1             TS      SKEEP2       -0
 0451                         20,2602  0 0006 1             EXTEND
 0452   REF 279 LAST 386      20,2603  20 000 0             MSU     A            $ MSU SC, +0
 0453   REF   4 LAST 385      20,2604  0 2032 1             TC      +0CHK
 0454                         20,2605  0 0006 1             EXTEND
 0455   REF   9 LAST 386      20,2606  21'372 1             MSU     SKEEP2       $ MSU ERASABLE, +1
 0456   REF  17 LAST 386      20,2607  0 2040 1             TC      +1CHK
 0457                         20,2610  0 0006 1             EXTEND
 0458   REF  13 LAST 386      20,2611  3 3432 1             DCA     S+MAX
 0459                         20,2612  0 0006 1             EXTEND
 0460   REF 119 LAST 386      20,2613  20 001 1             MSU     L            $ CHECKS RUS WA, ALSO -1 FROM NEG. NO.
 0461   REF 280 LAST 386      20,2614  54 000 0             TS      A
 0462                         20,2615  0 2617 0             TC      +2
 0463   REF  40 LAST 385      20,2616  0 2020 1             TC      ERRORS
 0464   REF  18 LAST 386      20,2617  0 2041 0             TC      -1CHK

R0465   MASKCHK  FINISHES CHECKING MASK INSTRUCTION.
 0466   REF   2 LAST 378      20,2620  3 7663 0  MASKCHK    CA      S+7
 0467   REF 120 LAST 386      20,2621  54 001 1             TS      L
 0468   REF   2 LAST 378      20,2622  7 2014 1             MASK    S-7          $ MASK FIXED MEMORY
 0469   REF   5 LAST 386      20,2623  0 2032 1             TC      +0CHK
 0470   REF  10 LAST 385      20,2624  3 7657 1             CA      S+1
 0471   REF 121 LAST 386      20,2625  7 0001 1             MASK    L            $ MASK SC
 0472   REF  18 LAST 386      20,2626  0 2040 1             TC      +1CHK

R0473   NDX+SU FINISHES CHECKING BOTH INDEX INSTRUCTIONS. ALSO CHECKS ALL OF SU
R0474   EXCEPT RB WG.
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 0475  REF  11 LAST 386    20,2627  3 7657 1  NDX+SU   CA      S+1
 0476  REF 122 LAST 386    20,2630  54 001 1           TS      L
 0477  REF  26 LAST 386    20,2631  55'371 1           TS      SKEEP1
 0478  REF 281 LAST 386    20,2632  50 000 1           NDX     A                $ NDX SC
 0479                      20,2633  6 0000 1           AD      0000             AD L, +2
 0480                      20,2634  0 0006 1           EXTEND
 0481  REF  27 LAST 387    20,2635  61'371 0           SU      SKEEP1           $ SU ERASABLE
 0482  REF  19 LAST 386    20,2636  0 2040 1           TC      +1CHK
 0483                      20,2637  0 0006 1           EXTEND
 0484  REF 123 LAST 387    20,2640  5 0001 0           NDX     L                $ NDX SC
 0485                      20,2641  60 000 1           SU      0000             $ SU SC, SU L
 0486  REF  19 LAST 386    20,2642  0 2041 0           TC      -1CHK

R0487  D--SC CHECKS DCS SC, DXCH SC, AND DCA SC.
 0488  REF   5 LAST 386    20,2643  3 7656 0  D--SC    CA      S+2
 0489  REF 124 LAST 387    20,2644  54 001 1           TS      L                +2
 0490  REF  12 LAST 387    20,2645  3 7657 1           CA      S+1
 0491                      20,2646  0 0006 1           EXTEND
 0492  REF 282 LAST 387    20,2647  4 0001 1           DCS     A                $ DCS SC, C(L) = -2
 0493  REF  20 LAST 387    20,2650  0 2041 0           TC      -1CHK
R0494  AFTER DXCH C(A) = B(Q) = +3, C(L) = B(A) = +0, C(Q) = B(L) = -1.
 0495  REF 125 LAST 387    20,2651  52 002 1           DXCH    L                $ DXCH SC
 0496  REF   6 LAST 385    20,2652  55'373 0           TS      SKEEP3
 0497  REF 250 LAST 386    20,2653  6 0002 0           AD      Q
 0498  REF  20 LAST 387    20,2654  0 2040 1           TC      +1CHK
 0499  REF 126 LAST 387    20,2655  3 0001 0           CA      L
 0500  REF   6 LAST 386    20,2656  0 2032 1           TC      +0CHK
 0501  REF   3 LAST 383    20,2657  3 7667 1           CA      S-1
 0502  REF 251 LAST 387    20,2660  54 002 1           TS      Q
 0503  REF 283 LAST 387    20,2661  4 0000 0           CS      A
 0504                      20,2662  0 0006 1           EXTEND
R0505  AFTER DCA C(A) = C(L) = C(Q) = B(Q) = -1.
 0506  REF 127 LAST 387    20,2663  3 0002 0           DCA     L                $ DCA SC
 0507  REF 252 LAST 387    20,2664  6 0002 0           AD      Q
 0508  REF   7 LAST 387    20,2665  6 1373 1           AD      SKEEP3
 0509  REF  21 LAST 387    20,2666  0 2040 1           TC      +1CHK
 0510  REF 128 LAST 387    20,2667  3 0001 0           CA      L
 0511  REF  21 LAST 387    20,2670  0 2041 0           TC      -1CHK

R0512  D--LCHK CHECKS THAT OVERFLOW IS LOST IN PROCESS OF GOING THROUGH L REG.
R0513  ALSO CHECKS THAT Q WILL HOLD 16 BITS
 0514  REF   2 LAST 383    20,2671  3 7670 1  D--LCHK  CA      S-2
 0515  REF 253 LAST 387    20,2672  54 002 1           TS      Q
 0516  REF   1             20,2673  3 3432 1           CA      S-MAX
 0517  REF 254 LAST 387    20,2674  26 002 1           ADS     Q
 0518  REF 255 LAST 387    20,2675  4 0002 1           CS      Q
 0519  REF 284 LAST 387    20,2676  54 000 0           TS      A
 0520  REF  41 LAST 386    20,2677  0 2020 1           TC      ERRORS
 0521                      20,2700  0 0006 1           EXTEND
 0522  REF 129 LAST 387    20,2701  3 0002 0           DCA     L
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LINS    AGC BLOCK TWO SELF-CHECK                                                            USER'S OWN PAGE NO.  12

 0523   REF 285 LAST 387      20,2702  54 000 0            TS      A
 0524                         20,2703  0 2705 1            TC      +2
 0525   REF  42 LAST 387      20,2704  0 2020 1            TC      ERRORS
 0526   REF  22 LAST 387      20,2705  0 2041 0            TC      -1CHK

R0527   CHECKS OVERFLOW, UNDERFLOW,END-AROUND-CARRY, AND SIGN CHANGE OF ADDER.
R0528   ALSO CHECKS ADS SC WITH OVERFLOW AND TS A WITH UNDERFLOW
 0529   REF   4 LAST 385      20,2706  3 7642 0  ADDRCHK   CA      SBIT14         20000
 0530   REF 256 LAST 387      20,2707  54 002 1            TS      Q
 0531   REF 257 LAST 388      20,2710  26 002 1            ADS     Q              $ ADS SC, OVERFLOW
 0532   REF 258 LAST 388      20,2711  26 002 1            ADS     Q              UNDERFLOW
 0533   REF 286 LAST 388      20,2712  54 000 0            TS      A              $ TS SC WITH UNDERFLOW
 0534   REF  43 LAST 388      20,2713  0 2020 1            TC      ERRORS
 0535   REF 259 LAST 388      20,2714  26 002 1            ADS     Q
 0536   REF  22 LAST 387      20,2715  0 2040 1            TC      +1CHK

R0537   RUPTCHK CHECKS THAT INTERRUPT DOES NOT OCCUR WHILE OVERFLOW OR UNDERFLOW
R0538   IS IN THE A REGISTER. ALSO CHECKS THAT INHINT RELINT WORK PROPERLY.
 0539                         20,2716  0 0004 0  RUPTCHK   INHINT
 0540   REF   5 LAST 386      20,2717  3 7665 0            CA      S+ZERO
 0541   REF   1               20,2720  54 015 1            TS      ZRUPT
 0542                         20,2721  0 0003 1            RELINT
 0543   REF   4 LAST 163      20,2722  6 0027 1            AD      TIME4
 0544   REF  28 LAST 387      20,2723  55'371 1            TS      SKEEP1
 0545   REF  29 LAST 388      20,2724  4 1371 1  TENMS     CS      SKEEP1
 0546   REF   5 LAST 388      20,2725  6 0027 1            AD      TIME4          WAIT FOR NEXT TIME4 INCREMENT
 0547                         20,2726  0 0006 1            EXTEND
 0548   REF   1               20,2727  1 2724 0            BZF     TENMS
 0549                         20,2730  0 0004 0            INHINT
 0550   REF   2 LAST 388      20,2731  3 0015 0            CA      ZRUPT
 0551                         20,2732  0 0006 1            EXTEND
 0552                         20,2733  1 2735 0            BZF     +2             NO INTERRUPT.
 0553   REF   1               20,2734  0 2716 0            TC      RUPTCHK        THERE WAS AN INTERRUPT. START AGAIN.
 0554   REF  13 LAST 387      20,2735  3 7657 1            CAF     S+1            2 1/2 MS UNTILE NEXT T3 INTERRUPT.
 0555   REF  39 LAST 368      20,2736  0 4536 0            TC      WAITLIST
 0556   REF  40 LAST 281                      E3           EBANK=  LST1
 0557                         20,2737   02762 0            2CADR   TSKADRS
C0557   REF   1               20,2740   40003 0
 0558   REF  14 LAST 386      20,2741  3 3431 1            CA      S+MAX
 0559   REF   1               20,2742  6 2010 1            AD      OVCON          CONTROLS TIME SPENT IN OF-UF LOOP
 0560                         20,2743  0 0003 1            RELINT
 0561   REF 287 LAST 388      20,2744  4 0000 0  WAIT      CS      A
 0562   REF 288 LAST 388      20,2745  10 000 0            CCS     A
 0563   REF   1               20,2746  0 2752 0            TC      INHNTCHK
 0564   REF   1               20,2747   02756 1  RUPTCON   ADRES   C(BRUPT)
 0565   REF   6 LAST 387      20,2750  6 7656 0            AD      S+2
 0566   REF   1               20,2751  0 2744 1            TC      WAIT
 0567                         20,2752  0 0004 0  INHNTCHK  INHINT                 T3 RUPT SHOULD BE WAITING
 0568   REF   3 LAST 384      20,2753  55'375 0            TS      SKEEP5
 0569   REF  44 LAST 388      20,2754  0 2020 1            TC      ERRORS
 0570                       20,2755  0 0003 1            RELINT
 0571   REF   3 LAST 388    20,2756  4 0015 1  C(BRUPT)  CS       ZRUPT         INTERRUPT SHOULD HAPPEN HERE
 0572                       20,2757  0 0006 1            EXTEND
 0573   REF  45 LAST 388    20,2760  1 2020 0            BZF      ERRORS        MAKES SURE AN INTERRUPT DID HAPPEN
 0574                       20,2761  0 2766 1            TC       +5            END OF RUPTCHK
 0575   REF   4 LAST 389    20,2762  4 0015 1  TSKADRS   CS       ZRUPT
 0576   REF   1             20,2763  6 2747 1            AD       RUPTCON
 0577   REF  23 LAST 388    20,2764  0 2041 0            TC       -1CHK
 0578   REF  32 LAST 369    20,2765  0 4602 1            TC       TASKOVER

 0579   REF   3 LAST 379    20,2766  0 2047 0            TC       SMODECHK

R0580   IN-OUT1 CHECKS ALL PULSES OF WRITE AND READ
 0581   REF   4 LAST 387    20,2767  3 7667 1  IN-OUT1   CA       S-1
 0582                       20,2770  0 0006 1  WRITECHK  EXTEND
 0583   REF 260 LAST 388    20,2771  01 002 1            WRITE    Q
 0584   REF 261 LAST 389    20,2772  22 002 0            LXCH     Q             PUT C(Q) IN L
 0585   REF  24 LAST 389    20,2773  0 2041 0            TC       -1CHK
 0586                       20,2774  0 0006 1  READCHK   EXTEND                 C(L) = 77776
 0587   REF 130 LAST 387    20,2775  00 001 0            READ     L
 0588   REF  25 LAST 389    20,2776  0 2041 0            TC       -1CHK
 0589   REF 131 LAST 389    20,2777  3 0001 0            CA       L
 0590   REF  26 LAST 389    20,3000  0 2041 0            TC       -1CHK

R0591   IN-OUT2 CHECKS ALL PULSES OF ROR AND WOR
 0592   REF   4 LAST 384    20,3001  4 6165 1  IN-OUT2   CS       S+3
 0593   REF 132 LAST 389    20,3002  54 001 1  RORCHK    TS       L             77774
 0594   REF   6 LAST 385    20,3003  3 2011 0            CA       DVCON         37776
 0595                       20,3004  0 0006 1            EXTEND
 0596   REF 133 LAST 389    20,3005  04 001 1            ROR      L             $ ROR, -1
 0597   REF  27 LAST 389    20,3006  0 2041 0            TC       -1CHK
 0598   REF   7 LAST 389    20,3007  3 2011 0  WORCHK    CA       DVCON         C(L) STILL 77774
 0599                       20,3010  0 0006 1            EXTEND
 0600   REF 134 LAST 389    20,3011  05 001 0            WOR      L             $ WOR, -1
 0601   REF  28 LAST 389    20,3012  0 2041 0            TC       -1CHK
 0602   REF 135 LAST 389    20,3013  3 0001 0            CA       L
 0603   REF  29 LAST 389    20,3014  0 2041 0            TC       -1CHK

R0604   IN-OUT3 CHECKS ALL PULSES OF RAND, WAND, AND RXOR
 0605   REF   8 LAST 389    20,3015  4 2011 1  IN-OUT3   CS       DVCON
 0606   REF 136 LAST 389    20,3016  54 001 1  RANDCHK   TS       L             40001
 0607   REF   3 LAST 385    20,3017  3 2006 0            CA       S13BITS       17777
 0608                       20,3020  0 0006 1            EXTEND
 0609   REF 137 LAST 389    20,3021  02 001 1            RAND     L             $ RAND, +1
 0610   REF  23 LAST 388    20,3022  0 2040 1            TC       +1CHK
 0611   REF   4 LAST 389    20,3023  3 2006 0  WANDCHK   CA       S13BITS       C(L) STILL 40001
 0612                       20,3024  0 0006 1            EXTEND
 0613   REF 138 LAST 389    20,3025  03 001 0            WAND     L             $ WAND, +1
 0614   REF  24 LAST 389    20,3026  0 2040 1            TC       +1CHK
 0615   REF   2 LAST 382    20,3027  4 7664 0            CS       S+5
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LINS     AGC BLOCK TWO SELF-CHECK                                                         USER'S OWN PAGE NO.  14

 0616    REF 139 LAST 389     20,3030  56 001 0            XCH     L                      ALSO PUT -5 IN L FOR RXORCHK
 0617    REF  25 LAST 389     20,3031  0 2040 1            TC      +1CHK
 0618    REF   1              20,3032  3 6162 1  RXORCHK   CA      S+6
 0619                         20,3033  0 0006 1            EXTEND
 0620    REF 140 LAST 390     20,3034  06 001 0            RXOR    L                      $ RXOR, -3
 0621    REF   7 LAST 388     20,3035  6 7656 0            AD      S+2
 0622    REF  30 LAST 389     20,3036  0 2041 0            TC      -1CHK
 0623    REF 141 LAST 390     20,3037  3 0001 0            CA      L
 0624    REF   1              20,3040  6 7655 0            AD      S+4
 0625    REF  31 LAST 390     20,3041  0 2041 0            TC      -1CHK

 0626    REF   4 LAST 389     20,3042  0 2047 0            TC      SMODECHK

R0627    COUNTCHK COUNTS UP 14 BIT NUMBER WITH SIGN.
R0628    TAKES APPROXIMATELY 8.7 SECONDS.
R0629    ** PUT IN CCS NEWJOB FOR ROPE.
 0630                         20,3043  0 0006 1  COUNTCHK  EXTEND
 0631    REF  15 LAST 388     20,3044  3 3432 1            DCA     S+MAX
 0632    REF   9 LAST 384     20,3045  53'377 1            DXCH    SKEEP6                 PUT 37777 IN SKEEP6 AND 40000 IN SKEEP7
 0633    REF  10 LAST 390     20,3046  3 1376 1  +LOOP     CA      SKEEP6
 0634    REF 262 LAST 389     20,3047  56 002 0            XCH     Q
 0635                         20,3050  0 0006 1            EXTEND
 0636    REF 142 LAST 390     20,3051  4 0002 1            DCS     L
 0637    REF 289 LAST 388     20,3052  10 000 0            CCS     A
 0638    REF   1              20,3053  0 3062 0            TC      -NMBR
 0639    REF   1              20,3054  0 3067 0            TC      ENDCOUNT
 0640    REF  11 LAST 390     20,3055  55'376 0            TS      SKEEP6
 0641    REF   4 LAST 380     20,3056  6 1377 0            AD      SKEEP7
 0642    REF  32 LAST 390     20,3057  0 2041 0            TC      -1CHK
 0643    REF   5 LAST 390     20,3060  25'377 0            INCR    SKEEP7
 0644    REF   1              20,3061  0 3046 0            TC      +LOOP
 0645    REF 143 LAST 390     20,3062  6 0001 0  -NMBR     AD      L
 0646    REF  33 LAST 390     20,3063  0 2041 0            TC      -1CHK
 0647    REF   3 LAST 378     20,3064  0 4457 0            TC      CHECKNJ                CHECK FOR NEW JOB
 0648    REF  12 LAST 390     20,3065  4 1376 0            CS      SKEEP6
 0649    REF   2 LAST 390     20,3066  0 3047 1            TC      +LOOP +1
 0650    REF   6 LAST 390     20,3067  3 1377 0  ENDCOUNT  CA      SKEEP7                 -0
 0651    REF  13 LAST 390     20,3070  6 1376 1            AD      SKEEP6                 SKEEP6 SHOULD BE +0
 0652    REF   7 LAST 385     20,3071  0 2033 0            TC      -0CHK

R0653    O-UFLOW COUNTS DOWN OVERFLOW AND UNDERFLOW NUMBERS.
R0654    TAKES APPROXIMATELY 10.8 SECONDS
 0655    REF   2 LAST 387     20,3072  3 3432 1  O-UFLOW   CA      S-MAX
 0656    REF   4 LAST 388     20,3073  55'375 0            TS      SKEEP5                 40000
 0657    REF 290 LAST 390     20,3074  4 0000 0            CS      A
 0658                         20,3075  0 0004 0  OFLOOP    INHINT
 0659    REF  16 LAST 390     20,3076  6 3431 1            AD      S+MAX
 0660    REF  14 LAST 388     20,3077  6 7657 1            AD      S+1
 0661    REF 263 LAST 390     20,3100  56 002 0            XCH     Q
 0662    REF 264 LAST 390     20,3101  10 002 1            CCS     Q
 0663   REF   1               20,3102  0 3117 0            TC      -NMBRS
 0664   REF  46 LAST 389      20,3103  0 2020 1            TC      ERRORS           CAN PUT IN CONSTANT
 0665   REF   8 LAST 387      20,3104  55,373 0            TS      SKEEP3
 0666   REF  47 LAST 391      20,3105  0 2020 1            TC      ERRORS
 0667   REF   9 LAST 391      20,3106  3 1373 1            CA      SKEEP3
 0668   REF   5 LAST 390      20,3107  6 1375 1            AD      SKEEP5
 0669   REF  34 LAST 390      20,3110  0 2041 0            TC      -1CHK
 0670                         20,3111  0 0003 1            RELINT
 06701  REF   4 LAST 390      20,3112  0 4457 0            TC      CHECKNJ          CHECK FOR NEW JOB
 0671   REF   6 LAST 385      20,3113  3 1374 0            CA      SKEEP4
 0672                         20,3114  0 0006 1            EXTEND
 0673   REF   6 LAST 391      20,3115  27'375 0            DIM     SKEEP5
 0674   REF   1               20,3116  0 3075 0            TC      OFLOOP
 0675   REF   7 LAST 391      20,3117  55,374 1  -NMBRS    TS      SKEEP4
 0676   REF   1               20,3120  0 3130 0            TC      ENDOFUF
 0677   REF   8 LAST 391      20,3121  3 1374 0            CA      SKEEP4
 0678   REF   7 LAST 391      20,3122  6 1375 1            AD      SKEEP5
 0679   REF  35 LAST 391      20,3123  0 2041 0            TC      -1CHK
 0681   REF   8 LAST 391      20,3124  3 1375 1            CA      SKEEP5
 0682   REF   3 LAST 390      20,3125  6 3432 1            AD      S-MAX
 0683   REF   5 LAST 389      20,3126  6 7667 1            AD      S-1
 0684   REF   2 LAST 391      20,3127  0 3100 0            TC      OFLOOP +3
 0685   REF   9 LAST 391      20,3130  3 1375 1  ENDOFUF   CA      SKEEP5
 0686   REF   8 LAST 390      20,3131  0 2033 0            TC      -0CHK
 0687   REF   9 LAST 391      20,3132  4 1374 1            CS      SKEEP4
 0688   REF   9 LAST 389      20,3133  6 2011 0            AD      DVCON
 0689   REF  36 LAST 391      20,3134  0 2041 0            TC      -1CHK
 0690                         20,3135  0 0003 1            RELINT

 0691   REF   5 LAST 390      20,3136  0 2047 0            TC      SMODECHK

R0692   SKEEP7 HOLDS LOWEST OF TWO ADDRESSES BEING CHECKED.
R0693   SKEEP6 HOLDS B(X+1).
R0694   SKEEP5 HOLDS B(X).
R0695   SKEEP4 CONTROLS CHECKING OF NON-SWITCHABLE ERASABLE MEMORY WITH
R0696   BANK NUMBERS IN EB.
R0697   SKEEP3 HOLDS LAST ADDRESS BEING CHECKED (HIGHEST ADDRESS).
R0698   SKEEP2 HOLDS C(EBANK) DURING CHECKNJ
R0699   ERASCHK TAKES APPROXMATELY 7 SECONDS
 0700   REF  15 LAST 390      20,3137  3 7657 1  ERASCHK   CA      S+1
 0701   REF  10 LAST 391      20,3140  55'374 1            TS      SKEEP4
 0702   REF   6 LAST 388      20,3141  3 7665 0  0EBANK    CA      S+ZERO
 0703   REF  17 LAST 372      20,3142  54 003 0            TS      EBANK
 0704   REF   1               20,3143  3 2004 1            CA      ERASCON3         01462
 0705   REF   7 LAST 390      20,3144  55,377 1            TS      SKEEP7           STARTING ADDRESS
 0706   REF   1               20,3145  3 6426 1            CA      S10BITS          01777
 0707   REF  10 LAST 391      20,3146  55'373 0            TS      SKEEP3           LAST ADDRESS CHECKED
 0708   REF   1               20,3147  0 3167 1            TC      ERASLOOP

 0709   REF   1               20,3150  3 2003 0  E134567B  CA      ERASCON6         01400
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0710  REF    8 LAST 391     20,3151  55'377 1             TS      SKEEP7      STARTING ADDRESS
0711  REF    2 LAST 391     20,3152  3 6426 1             CA      S10BITS     01777
0712  REF   11 LAST 391     20,3153  55'373 0             TS      SKEEP3      LAST ADDRESS CHECKED
0713  REF    2 LAST 391     20,3154  0 3167 1             TC      ERASLOOP

0714  REF    2 LAST 391     20,3155  3 2003 0  2EBANK     CA      ERASCON6    01400
0715  REF    9 LAST 392     20,3156  55'377 1             TS      SKEEP7      STARTING ADDRESS
0716  REF    1              20,3157  3 2005 0             CA      ERASCON4    01774
0717  REF   12 LAST 392     20,3160  55'373 0             TS      SKEEP3      LAST ADDRESS CHECKED
0718  REF    3 LAST 392     20,3161  0 3167 1             TC      ERASLOOP

0719  REF   11 LAST 391     20,3162  55'374 1  NOEBANK    TS      SKEEP4      +0
0720  REF    1              20,3163  3 2001 1             CA      ERASCON1    00062
0721  REF   10 LAST 392     20,3164  55'377 1             TS      SKEEP7      STARTING ADDRESS
0722  REF    1              20,3165  3 2002 1             CA      ERASCON2    01374
0723  REF   13 LAST 392     20,3166  55'373 0             TS      SKEEP3      LAST ADDRESS CHECKED

0724                        20,3167  0 0004 0  ERASLOOP   INHINT
0725  REF   11 LAST 392     20,3170  3 1377 0             CA      SKEEP7
0726  REF  144 LAST 390     20,3171  54 001 1             TS      L
0727  REF  145 LAST 392     20,3172  24 001 0             INCR    L
0728  REF  291 LAST 390     20,3173  50 000 1             NDX     A
0729                        20,3174  52 001 1             DXCH    0000        PUTS OWN ADDRESS IN X AND X +1
0730  REF   10 LAST 391     20,3175  53'376 0             DXCH    SKEEP5      STORES C(X) AND C(X-1) IN SKEEP6 AND 5
0731  REF   12 LAST 392     20,3176  51'377 0             NDX     SKEEP7
0732                        20,3177  4 0001 1             CS      0001        CS  X+1
0733  REF   13 LAST 392     20,3200  51'377 0             NDX     SKEEP7
0734                        20,3201  6 0000 1             AD      0000        AD X
0735  REF   37 LAST 391     20,3202  0 2041 0             TC      -1CHK
0736                        20,3203  0 0006 1             EXTEND
0737  REF   14 LAST 392     20,3204  5 1377 0             NDX     SKEEP7
0738                        20,3205  4 0001 1             DCS     0000        COMPLEMENT OF ADDRESS OF X AND X+1
0739  REF   15 LAST 392     20,3206  51'377 0             NDX     SKEEP7
0740                        20,3207  52 001 1             DXCH    0000        PUT COMPLEMENT OF ADDRESS OF X AND X+1
0741  REF   16 LAST 392     20,3210  51'377 0             NDX     SKEEP7
0742                        20,3211  4 0000 0             CS      0000        CS  X
0743  REF   17 LAST 392     20,3212  51'377 0             NDX     SKEEP7
0744                        20,3213  6 0001 0             AD      0001        AD X+1
0745  REF   38 LAST 392     20,3214  0 2041 0             TC      -1CHK
0746  REF   11 LAST 392     20,3215  53'376 0             DXCH    SKEEP5
0747  REF   18 LAST 392     20,3216  51'377 0             NDX     SKEEP7
0748                        20,3217  52 001 1             DXCH    0000        PUT B(X) AND B(X+1) BACK INTO X AND X+1
0749                        20,3220  0 0003 1             RELINT
0750  REF   18 LAST 391     20,3221  3 0003 1             CA      EBANK       STORES C(EBANK)
0751  REF   10 LAST 386     20,3222  55'372 1             TS      SKEEP2
0752  REF    5 LAST 391     20,3223  0 4457 0             TC      CHECKNJ     CHECK FOR NEW JOB
0753  REF   11 LAST 392     20,3224  3 1372 0             CA      SKEEP2      REPLACES B(EBANK)
0754  REF   19 LAST 392     20,3225  54 003 0             TS      EBANK
0755  REF   19 LAST 392     20,3226  25'377 0             INCR    SKEEP7
0756  REF   20 LAST 392     20,3227  4 1377 1             CS      SKEEP7
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LINS    AGC BLOCK TWO SELF-CHECK                                                       USER'S OWN PAGE NO.  17

 0757   REF  14 LAST 392     20,3230  6 1373 1            AD       SKEEP3
 0758                        20,3231  0 0006 1            EXTEND
 0759                        20,3232  1 3234 0            BZF      +2
 0760   REF   4 LAST 392     20,3233  0 3167 1            TC       ERASLOOP         GO TO NEXT ADDRESS IN SAME BANK
 0761   REF  12 LAST 392     20,3234  11'374 1            CCS      SKEEP4
 0762   REF   1              20,3235  0 3162 1            TC       NOEBANK
 0763   REF  13 LAST 393     20,3236  25'374 0            INCR     SKEEP4           PUT +1 IN SKEEP4
 0764   REF  20 LAST 392     20,3237  3 0003 1            CA       EBANK
 0765   REF   2 LAST 380     20,3240  6 7647 0            AD       SBIT9
 0766   REF  21 LAST 393     20,3241  54 003 0            TS       EBANK
 0767   REF   1              20,3242  6 2013 1            AD       ERASCON5         76377 CHECK FOR BANK E3
 0768                        20,3243  0 0006 1            EXTEND
 0769   REF   1              20,3244  1 3155 1            BZF      2EBANK
 0770   REF  22 LAST 393     20,3245  10 003 0            CCS      EBANK
 0771   REF   1              20,3246  0 3150 0            TC       E134567B         GO TO EBANKS 1,3,4,5,6, AND 7
 0772   REF   3 LAST 392     20,3247  3 2003 0            CA       ERASCON6         END OF ERASCHK
 0773   REF  23 LAST 393     20,3250  54 003 0            TS       EBANK
R0774   CNTRCHK PERFORMS A CS OF ALL REGISTERS FROM OCT. 61 THROUGH OCT. 10.
R0775   INCLUDED ARE ALL COUNTERS, T6-1, CYCLE AND SHIFT, AND ALL RUPT REGISTERS
 0776   REF   1              20,3251  3 2000 0  CNTRCHK   CAF      CNTRCON          00051
 0777   REF  12 LAST 392     20,3252  55'372 1  CNTRLOOP  TS       SKEEP2
 0778   REF   1              20,3253  6 7654 1            AD       SBIT4            +10 OCTAL
 0779   REF 292 LAST 392     20,3254  50 000 1            INDEX    A
 0780                        20,3255  4 0000 0            CS       0000
 0781   REF  13 LAST 393     20,3256  11'372 1            CCS      SKEEP2
 0782   REF   1              20,3257  0 3252 1            TC       CNTRLOOP

R0783   CYCLSHFT CHECKS THE CYCLE AND SHIFT REGISTERS
 0784   REF   1              20,3260  3 2007 1  CYCLSHFT  CA       CONC+S1          25252
 0785   REF  44 LAST 355     20,3261  54 020 1            TS       CYR              C(CYR) = 12525
 0786   REF  21 LAST 356     20,3262  54 022 0            TS       CYL              C(CYL) = 52524
 0787   REF  42 LAST 381     20,3263  54 021 0            TS       SR               C(SR) = 12525
 0788   REF   5 LAST  35     20,3264  54 023 1            TS       EDOP             C(EDOP) = 00125
 0789   REF  45 LAST 393     20,3265  6 0020 0            AD       CYR              37777          C(CYR) = 45252
 0790   REF  22 LAST 393     20,3266  6 0022 1            AD       CYL              00-12524       C(CYL) = 25251
 0791   REF  43 LAST 393     20,3267  6 0021 1            AD       SR               00-25251       C(SR) = 05252
 0792   REF   6 LAST 393     20,3270  6 0023 0            AD       EDOP             00-25376       C(EDOP) = +0
 0793   REF   1              20,3271  6 2012 0            AD       CONC+S2          C(CONC+S2) = 52400
 0794   REF  39 LAST 392     20,3272  0 2041 0            TC       -1CHK
 0795   REF  46 LAST 393     20,3273  6 0020 0            AD       CYR              45252
 0796   REF  23 LAST 393     20,3274  6 0022 1            AD       CYL              72523
 0797   REF  44 LAST 393     20,3275  6 0021 1            AD       SR               77775
 0798   REF   7 LAST 393     20,3276  6 0023 0            AD       EDOP             77775
 0799   REF  16 LAST 391     20,3277  6 7657 1            AD       S+1              77776
 0800   REF  40 LAST 393     20,3300  0 2041 0            TC       -1CHK

 0801   REF   3 LAST 378     20,3301  25'367 1            INCR     SCOUNT +1
 0802   REF   6 LAST 391     20,3302  0 2047 0            TC       SMODECHK
 0803   REF   2 LAST 379     20,3303  0 3307 0            TC       ROPECHK
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R0804    S<EEP1 HOLDS SUM
R0805    S<EEP2 HOLDS PRESENT CONTENTS OF ADDRESS IN ROPECHK AND SHOWSUM ROUTINES
R0806    S<EEP2 HOLDS BANK NUMBER IN LOW ORDER BITS DURING SHOWSUM DISPLAY
R0807    S<EEP3 HOLDS PRESENT ADDRESS (00000 TO 01777 IN COMMON FIXED BANKS)
R0808                                 (04000 TO 07777 IN FXFX BANKS)
R0809    S<EEP3 HOLDS BUGGER WORD DURING SHOWSUM DISPLAY
R0810    S<EEP4 HOLDS BANK NUMBER
R0811    S<EEP5 COUNTS 2 SUCCESSIVE TC SELF WORDS
R0812    S<EEP6 CONTROLS ROPECHK OR SHOWSUM OPTION
R0813    S<EEP7 CONTROLS WHEN ROUNTINE IS IN COMMON FIXED OR FIXED FIXED BANKS

 0814    REF   1               20,3304  0 5304 0  STSHOSUM TC      GRABDSP
 0815    REF   2 LAST 359      20,3305  0 5312 1           TC      PREGBSY
 0816                          20,3306  0 3311 1           TC      +3
 0817    REF   2 LAST 385      20,3307  3 7666 0  ROPECHK  CA      S-ZERO
 0818    REF  14 LAST 390      20,3310  55'376 0           TS      SKEEP6          ROPECHK OPTION
 0819    REF   7 LAST 391      20,3311  3 7665 0           CA      S+ZERO
 0820    REF  14 LAST 393      20,3312  55'374 1           TS      SKEEP4          BANK NUMBER
 0821    REF  17 LAST 393      20,3313  3 7657 1           CA      S+1
 0822    REF  21 LAST 392      20,3314  55'377 1  COMMFX   TS      SKEEP7
 0823    REF   8 LAST 394      20,3315  3 7665 0           CA      S+ZERO
 0824    REF  30 LAST 388      20,3316  55'371 1           TS      SKEEP1
 0825    REF  15 LAST 393      20,3317  55'373 0           TS      SKEEP3
 0826    REF  18 LAST 394      20,3320  3 7657 1           CA      S+1
 0827    REF  12 LAST 392      20,3321  55'375 0           TS      SKEEP5          COUNTS DOWN 2 TC SELF WORDS
 0828    REF  16 LAST 394      20,3322  3 1373 1  COMADRS  CA      SKEEP3
 0829    REF  15 LAST 394      20,3323  6 1374 0           AD      SKEEP4
 0830    REF   2 LAST 330      20,3324  0 4116 0           TC      DATACALL
 0831    REF   1               20,3325  0 3351 0           TC      ADSUM
 0832    REF   1               20,3326  6 7645 1           AD      SBIT11          02000
 0833    REF   1               20,3327  0 3362 0           TC      ADRSCHK

 0834    REF 293 LAST 393      20,3330  4 0000 0  FXFX     CS      A
 0835    REF  22 LAST 394      20,3331  55'377 1           TS      SKEEP7
 0836                          20,3332  0 0006 1           EXTEND
 0837                          20,3333  1 3336 0           BZF     +3
 0838    REF   1               20,3334  3 7644 0           CA      SBIT12          04000, STARTING ADDRESS OF BANK 02
 0839                          20,3335  0 3337 0           TC      +2
 0840    REF   1               20,3336  3 4506 0           CA      SBNK03          06000, STARTING ADDRESS OF BANK 03
 0841    REF  17 LAST 394      20,3337  55'373 0           TS      SKEEP3
 0842    REF   9 LAST 394      20,3340  3 7665 0           CA      S+ZERO
 0843    REF  31 LAST 394      20,3341  55'371 1           TS      SKEEP1
 0844    REF  19 LAST 394      20,3342  3 7657 1           CA      S+1
 0845    REF  13 LAST 394      20,3343  55'375 0           TS      SKEEP5          COUNTS DOWN 2 TC SELF WORDS
 0846                          20,3344  0 0006 1  FXADRS   EXTEND
 0847    REF  18 LAST 394      20,3345  5 1373 1           NDX     SKEEP3
 0848                          20,3346  3 0001 0           DCA     0000
 0849    REF   2 LAST 394      20,3347  0 3351 0           TC      ADSUM
 0850    REF   2 LAST 394      20,3350  0 3362 0           TC      ADRSCHK
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0851   REF  14 LAST 393    20,3351  55'372 1  ADSUM    TS      SKEEP2
0852   REF  32 LAST 394    20,3352  6 1371 0           AD      SKEEP1
0853   REF  33 LAST 395    20,3353  55'371 1           TS      SKEEP1
0854   REF  10 LAST 394    20,3354  3 7665 0           CAF     S+ZERO
0855   REF  34 LAST 395    20,3355  6 1371 0           AD      SKEEP1
0856   REF  35 LAST 395    20,3356  55'371 1           TS      SKEEP1
0857   REF  15 LAST 395    20,3357  4 1372 1           CS      SKEEP2
0858   REF  19 LAST 394    20,3360  6 1373 1           AD      SKEEP3
0859   REF 265 LAST 390    20,3361  0 0002 0           TC      Q

0860   REF 294 LAST 394    20,3362  10 000 0  ADRSCHK  CCS     A
0861   REF   1             20,3363  0 3373 0           TC      CONTINU
0862   REF   2 LAST 395    20,3364  0 3373 0           TC      CONTINU
0863   REF   3 LAST 395    20,3365  0 3373 0           TC      CONTINU
0864   REF  14 LAST 394    20,3366  11'375 0           CCS     SKEEP5
0865   REF   4 LAST 395    20,3367  0 3374 1           TC      CONTINU +1
0866   REF 146 LAST 392    20,3370  3 0001 0           CA      L
0867   REF   3 LAST 394    20,3371  0 3351 0           TC      ADSUM
0868   REF   1             20,3372  0 3434 1           TC      SOPTION        GO TO ROPECHK SHOSUM OPTION
0869   REF  20 LAST 394    20,3373  3 7657 1  CONTINU  CA      S+1            MAKE SURE TWO CONSECUTIVE TC SELF WORDS
0870   REF  15 LAST 395    20,3374  55'375 0           TS      SKEEP5
0871   REF  15 LAST 394    20,3375  11'376 0           CCS     SKEEP6         +1 IN SKEEP6, SHOWSUM VIA EXECUTIVE
0872   REF  18 LAST 281    20,3376  10 067 1           CCS     NEWJOB
0873   REF   3 LAST 281    20,3377  0 4404 0           TC      CHANG1
0874                       20,3400  0 3402 1           TC      +2
0875   REF   6 LAST 392    20,3401  0 4457 0           TC      CHECKNJ        -0 IN SKEEP6 FOR ROPECHK

0876   REF  20 LAST 395    20,3402  25'373 1  ADRS+1   INCR    SKEEP3
0877   REF  23 LAST 394    20,3403  11'377 1           CCS     SKEEP7
0878   REF   1             20,3404  0 3322 1           TC      COMADRS
0879   REF   2 LAST 395    20,3405  0 3322 1           TC      COMADRS
0880   REF   1             20,3406  0 3344 1           TC      FXADRS
0881   REF   2 LAST 395    20,3407  0 3344 1           TC      FXADRS

0882   REF  16 LAST 394    20,3410  3 1374 0  NXTBNK   CA      SKEEP4
0883   REF   2 LAST 394    20,3411  6 7645 1           AD      SBIT11
0884   REF  17 LAST 395    20,3412  55'374 1           TS      SKEEP4
0885                       20,3413  0 3416 1           TC      +3
0886   REF   2 LAST 381    20,3414  3 7641 0           CA      SBIT15
0887   REF  18 LAST 395    20,3415  55'374 1           TS      SKEEP4
0888   REF   1             20,3416  6 3437 1           AD      NOBANKNO       FIRST BANK NOT USED.
0889                       20,3417  0 0006 1           EXTEND
0890   REF   1             20,3420  1 3427 1           BZF     ENDSUMS
0891   REF  24 LAST 395    20,3421  11'377 1           CCS     SKEEP7
0892   REF   1             20,3422  0 3314 1           TC      COMMFX
0893   REF  21 LAST 395    20,3423  3 7657 1           CA      S+1
0894   REF   1             20,3424  0 3330 1           TC      FXFX
0895   REF   1             20,3425  3 7651 1           CA      SBIT7          CAN BE ANY NUMBER LARGER THAN 36 DECIMAL
0896   REF   2 LAST 395    20,3426  0 3314 1           TC      COMMFX
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 0897   REF  16 LAST 395     20,3427  11'376 0  ENDSUMS  CCS     SKEEP6
 0898   REF   3 LAST 393     20,3430  0 3311 1           TC      ROPECHK +2       START SHOWSUM AGAIN
 0899                        20,3431   37777 1  S+MAX    OCTAL   37777            ** S+MAX AND S-MAX MUST BE TOGETHER
 0900                        20,3432   40000 0  S-MAX    OCTAL   40000            FOR DOUBLE PRECISION CHECKING.
 0901   REF   2 LAST 379     20,3433  0 3515 0           TC      MPNMBRS -1       ROPECHK IS COMPLETED

 0902   REF  17 LAST 396     20,3434  11'376 0  SOPTION  CCS     SKEEP6           DECIDE ON ROPECHK OR SHOWSUM OPTION
 0903   REF   1              20,3435  0 3471 0           TC      SDISPLAY
 0904                        20,3436   00501 0  VNCON    OCTAL   00501            USED IN SHOWSUM. DISPLAY 3 REGISTERS.
 0905                        20,3437   33777 0  NOBANKNO OCTAL   33777            * CONSTANT, COMPLEMENT OF LAST BANK +1.
R0906   CHANGE TO 33777 IF BANK 21 IS LAST BANK USED
 0907   REF  36 LAST 395     20,3440  11'371 1  BNKCHK   CCS     SKEEP1           WHEN C(SKEEP6) = -0
 0908                        20,3441  0 3445 1           TC      +4
 0909   REF   2 LAST 396     20,3442   41471 0  SCADR    FCADR   SDISPLAY         * CONSTANT, USED IN SHOWSUM ONLY
 0910                        20,3443  0 3445 1           TC      +2
 0911   REF   6 LAST 391     20,3444  3 7667 1           CA      S-1              FOR BANK 00
 0912   REF  37 LAST 396     20,3445  55'371 1           TS      SKEEP1
 0913   REF  19 LAST 395     20,3446  3 1374 0           CA      SKEEP4
 0914   REF   5 LAST 328     20,3447  0 5207 1           TC      LEFT5
 0915   REF 295 LAST 395     20,3450  4 0000 0           CS      A
 0916   REF  38 LAST 396     20,3451  6 1371 0           AD      SKEEP1
 0917   REF  41 LAST 393     20,3452  0 2041 0           TC      -1CHK
 0918   REF   1              20,3453  0 3410 1           TC      NXTBNK

R0919   INITIALIZE SKEEP6 TO +1 TO PERFORM SHOWSUM
R0920   START OF ROUTINE THAT DISPLAYS SUM OF EACH BANK
 0921   REF  22 LAST 395     20,3454  3 7657 1  SHOWSUM  CAF     S+1
 0922   REF  18 LAST 396     20,3455  55'376 0           TS      SKEEP6           SHOWSUM OPTION
 0923   REF  11 LAST 395     20,3456  3 7665 0           CAF     S+ZERO
 0924   REF   6 LAST 378     20,3457  55'361 0           TS      SMODE            PUT SELF-CHECK TO SLEEP
 09241  REF   1              20,3460  3 2017 0           CA      SELFADRS         INITIALIZE SELFRET TO GO TO SELFCHK.
 09242  REF   5 LAST 158     20,3461  55'360 1           TS      SELFRET
 0925                        20,3462  0 0004 0           INHINT
 0926   REF   1              20,3463  3 7645 1           CAF     PRIO2
 0927   REF  18 LAST 366     20,3464  0 4363 0           TC      NOVAC
 0928   REF   6 LAST 396                    E2           EBANK=  SELFRET
 0929                        20,3465   03304 0           2CADR   STSHOSUM
C0929   REF   1              20,3466   40002 1
 0930                        20,3467  0 0003 1           RELINT
 0931   REF  49 LAST 363     20,3470  0 4440 0           TC      ENDOFJOB

 0932   REF  20 LAST 396     20,3471  3 1374 0  SDISPLAY CA      SKEEP4
 0933   REF   6 LAST 396     20,3472  0 5207 1           TC      LEFT5            CYCLES LEFT 5 PLACES
 0934   REF  16 LAST 395     20,3473  57'372 0           XCH     SKEEP2           SKEEP2 HOLDS BANK NUMBER DURING DISPLAY
 0935   REF  21 LAST 395     20,3474  55'373 0           TS      SKEEP3           SKEEP3 HOLDS BUGGER WORD DURING DISPLAY
 0936   REF   3 LAST 381     20,3475  3 2015 1  NOKILL   CAF     ADRS1            ADDRESS OF SKEEP1
 0937   REF 532 LAST 357     20,3476  54 142 1           TS      MPAC +2
 0938   REF   1              20,3477  3 3436 0           CAF     VNCON            DISPLAY 3 REGISTERS
 0939   REF   4 LAST 360     20,3500  0 5107 1           TC      NVSUB
 0940   REF   1              20,3501  0 3513 0           TC      SBUSY
 0941   REF   6 LAST 336     20,3502  0 5274 0             TC      FLASHON
 0942   REF  18 LAST 343     20,3503  0 5140 1             TC      ENDIDLE
 0943                        20,3504  0 3507 0             TC      +3              FINISHED WITH SHOWSUM
 0944   REF   2 LAST 396     20,3505  0 3410 1             TC      NXTBNK
 0945   REF   1              20,3506  0 3475 1             TC      NOKILL          SO CAN LOAD WITHOUT KILLING SHOWSUM
 0946   REF   8 LAST 278     20,3507  0 5401 1             TC      FREEDSP
 09461  REF   2 LAST 396     20,3510  3 2017 0             CA      SELFADRS        INITIALIZE SKEEP1 TO GO TO SELFCHK.
 09462  REF  39 LAST 396     20,3511  55'371 1             TS      SKEEP1
 0947   REF  50 LAST 396     20,3512  0 4440 0             TC      ENDOFJOB

 0948   REF   1              20,3513  3 3442 0  SBUSY      CAF     SCADR
 0949   REF   3 LAST 360     20,3514  0 5327 1             TC      NVSUBUSY

 0950   REF   7 LAST 393     20,3515  0 2047 0             TC      SMODECHK

R0951   MULTIPLY SUBROUTINE TAKES APPROXIMATELY 19 SECONDS.
R0952   (37777) X (37777 THROUGH 00001)
R0953   C(A) COUNTS DOWN.  C(L) COUNTS UP.
 0954   REF  17 LAST 390     20,3516  3 3431 1  MPNMBRS    CAF     S+MAX
 0955   REF  17 LAST 396     20,3517  55'372 1             TS      SKEEP2
 0956   REF  18 LAST 397     20,3520  3 3431 1             CAF     S+MAX
 0957                        20,3521  0 0006 1             EXTEND
 0958   REF  18 LAST 397     20,3522  7 1372 1             MP      SKEEP2
 0959   REF 147 LAST 395     20,3523  6 0001 0             AD      L               C(A) = 37777
 0960   REF   4 LAST 391     20,3524  6 3432 1             AD      S-MAX
 0961   REF   9 LAST 391     20,3525  0 2033 0             TC      -0CHK
 0962   REF   7 LAST 395     20,3526  0 4457 0             TC      CHECKNJ         CHECK FOR NEW JOB
 0963   REF  19 LAST 397     20,3527  11'372 1             CCS     SKEEP2
 0964   REF  20 LAST 397     20,3530  55'372 1             TS      SKEEP2
 0965   REF  21 LAST 397     20,3531  11'372 1             CCS     SKEEP2
 0966   REF   3 LAST 396     20,3532  0 3520 0             TC      MPNMBRS +2
R0967   (-1) X (37777 THROUGH 00001)
 0968   REF  19 LAST 397     20,3533  3 3431 1             CAF     S+MAX
 0969   REF  22 LAST 397     20,3534  55'372 1             TS      SKEEP2
 0970   REF   7 LAST 396     20,3535  3 7667 1  MPHIGH1    CAF     S-1
 0971                        20,3536  0 0006 1             EXTEND
 0972   REF  23 LAST 397     20,3537  7 1372 1             MP      SKEEP2          C(A) = -0
 0973   REF  10 LAST 397     20,3540  0 2033 0             TC      -0CHK
 0974   REF 148 LAST 397     20,3541  3 0001 0             CA      L
 0975   REF  24 LAST 397     20,3542  6 1372 0             AD      SKEEP2
 0976   REF  11 LAST 397     20,3543  0 2033 0             TC      -0CHK
 0977   REF   8 LAST 397     20,3544  0 4457 0             TC      CHECKNJ         CHECK FOR NEW JOB
 0978   REF  25 LAST 397     20,3545  11'372 1             CCS     SKEEP2
 0979   REF  26 LAST 397     20,3546  55'372 1             TS      SKEEP2
 0980   REF  27 LAST 397     20,3547  11'372 1             CCS     SKEEP2
 0981   REF   1              20,3550  0 3535 1             TC      MPHIGH1

R0982   INTERCHANGE MULTIPLIER AND MULTIPLICAND
R0983   (37777 THROUGH 00001) X (37777)
R0984   C(A) COUNTS DOWN.  C(L) COUNTS UP.
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 0985   REF  20 LAST 397    20,3551  3 3431 1            CAF     S+MAX
 0986   REF  40 LAST 397    20,3552  55'371 1            TS      SKEEP1
 0987   REF  41 LAST 398    20,3553  3 1371 0  MPAGAIN   CA      SKEEP1
 0988                       20,3554  0 0006 1            EXTEND
 0989   REF  21 LAST 398    20,3555  7 3431 0            MP      S+MAX
 0990   REF 149 LAST 397    20,3556  6 0001 0            AD      L                 C(A) = 37777
 0991   REF   5 LAST 397    20,3557  6 3432 1            AD      S-MAX
 0992   REF  12 LAST 397    20,3560  0 2033 0            TC      -0CHK
 0993   REF   9 LAST 397    20,3561  0 4457 0            TC      CHECKNJ           CHECK FOR NEW JOB
 0994   REF  42 LAST 398    20,3562  11'371 1            CCS     SKEEP1
 0995   REF  43 LAST 398    20,3563  55'371 1            TS      SKEEP1
 0996   REF  44 LAST 398    20,3564  11'371 1            CCS     SKEEP1
 0997   REF   1             20,3565  0 3553 1            TC      MPAGAIN
R0998   (37777 THROUGH 00001) X (-1)
 0999   REF  22 LAST 398    20,3566  3 3431 1            CAF     S+MAX
 1000   REF  45 LAST 398    20,3567  55'371 1            TS      SKEEP1
 1001   REF  46 LAST 398    20,3570  3 1371 0  MPHIGH2   CA      SKEEP1
 1002                       20,3571  0 0006 1            EXTEND
 1003   REF   8 LAST 397    20,3572  7 7667 0            MP      S-1
 1004   REF  13 LAST 398    20,3573  0 2033 0            TC      -0CHK
 1005   REF 150 LAST 398    20,3574  3 0001 0            CA      L
 1006   REF  47 LAST 398    20,3575  6 1371 0            AD      SKEEP1
 1007   REF  14 LAST 398    20,3576  0 2033 0            TC      -0CHK
 1008   REF  10 LAST 398    20,3577  0 4457 0            TC      CHECKNJ           CHECK FOR NEW JOB
 1009   REF  48 LAST 398    20,3600  11'371 1            CCS     SKEEP1
 1010   REF  49 LAST 398    20,3601  55'371 1            TS      SKEEP1
 1011   REF  50 LAST 398    20,3602  11'371 1            CCS     SKEEP1
 1012   REF   1             20,3603  0 3570 0            TC      MPHIGH2

 1013   REF   8 LAST 397    20,3604  0 2047 0            TC      SMODECHK

R1014   ONCE THROUGH DIVIDE SUBROUTINE TAKES APPROXIMATELY 0.01 SECOND.
R1015   TOTAL TIME SPENT IN DIVIDE SUBROUTINE IS APPROXIMATELY 21.5 SECONDS
R1016   DIVIDE +-/17777/ +-/37777/ BY +-/20000/. THE CONTENTS OF THE A REGISTER
R1017   AND THE L REGISTER WILL HAVE OPPOSITE SIGNS BEFORE DIVISION. THE
R1018   QUOTIENT SHOULD BE +-/37774/ DEPENDING ON THE SIGN OF A AND THE SIGN
R1019   OF THE DIVISOR. THE REMAINDER = +-1 DEPENDING ON THE SIGN OF A
 1020   REF   2 LAST 394    20,3605  4 7644 1  DVCHECK   CS      SBIT12            -(04000)
 1021   REF  21 LAST 396    20,3606  55'374 1            TS      SKEEP4
 1022   REF  22 LAST 398    20,3607  25'374 0  DVLOOP    INCR    SKEEP4
 1023   REF   5 LAST 388    20,3610  3 7642 0  DV1CHK    CA      SBIT14            20000
 1024   REF  51 LAST 398    20,3611  55'371 1            TS      SKEEP1
 1025   REF 296 LAST 396    20,3612  4 0000 0            CS      A
 1026   REF  28 LAST 397    20,3613  55'372 1            TS      SKEEP2
 1027   REF  23 LAST 398    20,3614  4 3431 0  DV1++     CS      S+MAX
 1028   REF 151 LAST 398    20,3615  54 001 1            TS      L                 40000
 1029   REF   5 LAST 389    20,3616  3 2006 0            CA      S13BITS
 1030                       20,3617  0 0006 1            EXTEND
 1031   REF  52 LAST 398    20,3620  11'371 1            DV      SKEEP1            +37774, +1
 1032   REF  25 LAST 395    20,3621  55'377 1            TS      SKEEP7            37774
 1033   REF   6 LAST 398    20,3622  3 3432 1            CA      S-MAX
 1034   REF 152 LAST 398    20,3623  56 001 0            XCH     L          ALSO PUT 40000 IN L
 1035   REF  26 LAST 390    20,3624  0 2040 1            TC      +1CHK
 1036   REF   6 LAST 398    20,3625  3 2006 0  DV1+-     CA      S13BITS    17777
 1037                       20,3626  0 0006 1            EXTEND
 1038   REF  29 LAST 398    20,3627  11'372 1            DV      SKEEP2     -37774, +1
 1039   REF  26 LAST 398    20,3630  6 1377 0            AD      SKEEP7
 1040   REF  15 LAST 398    20,3631  0 2033 0            TC      -0CHK
 1041   REF  24 LAST 398    20,3632  3 3431 1            CA      S+MAX
 1042   REF 153 LAST 399    20,3633  56 001 0            XCH     L          ALSO PUT 37777 IN L
 1043   REF  27 LAST 399    20,3634  0 2040 1            TC      +1CHK
 1044   REF   7 LAST 399    20,3635  4 2006 1  DV1-+     CS      S13BITS    60000
 1045                       20,3636  0 0006 1            EXTEND
 1046   REF  53 LAST 398    20,3637  11'371 1            DV      SKEEP1     -37774, -1
 1047   REF  19 LAST 396    20,3640  55'376 0            TS      SKEEP6
 1048   REF  27 LAST 399    20,3641  6 1377 0            AD      SKEEP7
 1049   REF  16 LAST 399    20,3642  0 2033 0            TC      -0CHK
 1050   REF  25 LAST 399    20,3643  3 3431 1            CA      S+MAX
 1051   REF 154 LAST 399    20,3644  56 001 0            XCH     L          ALSO PUT 37777 IN L
 1052   REF  42 LAST 396    20,3645  0 2041 0            TC      -1CHK
 1053   REF   8 LAST 399    20,3646  4 2006 1  DV1--     CS      S13BITS    60000
 1054                       20,3647  0 0006 1            EXTEND
 1055   REF  30 LAST 399    20,3650  11'372 1            DV      SKEEP2     +37774, -1
 1056   REF  20 LAST 399    20,3651  6 1376 1            AD      SKEEP6
 1057   REF  17 LAST 399    20,3652  0 2033 0            TC      -0CHK
 1058   REF  26 LAST 399    20,3653  3 3431 1            CA      S+MAX
 1059   REF 155 LAST 399    20,3654  56 001 0            XCH     L          ALSO PUT 37777 IN L FOR DV2
 1060   REF  43 LAST 399    20,3655  0 2041 0            TC      -1CHK
 1061   REF  21 LAST 399    20,3656  3 1376 1            CA      SKEEP6     -37774
 1062   REF   3 LAST 387    20,3657  6 7670 1            AD      S-2        -37776
 1063   REF  27 LAST 399    20,3660  6 3431 1            AD      S+MAX
 1064   REF  28 LAST 399    20,3661  0 2040 1            TC      +1CHK

R1065   DIVIDE +17777 + 37777 BY +20000.  THE RESULT SHOULD BE +37777 WITH
R1066   +17777 REMAINDER.
 1067   REF   9 LAST 399    20,3662  3 2006 0  DV2CHK    CA      S13BITS
 1068                       20,3663  0 0006 1            EXTEND
 1069   REF  54 LAST 399    20,3664  11'371 1            DV      SKEEP1
 1070   REF   7 LAST 399    20,3665  6 3432 1            AD      S-MAX
 1071   REF  18 LAST 399    20,3666  0 2033 0            TC      -0CHK
 1072   REF   6 LAST 398    20,3667  4 7642 1            CS      SBIT14     -20000
 1073   REF 156 LAST 399    20,3670  6 0001 0            AD      L
 1074   REF  44 LAST 399    20,3671  0 2041 0            TC      -1CHK

R1097   DIVIDE +37776 BY +37776.  THE RESULT SHOULD BE +37777 AND THE
R1098   REMAINDER SHOULD BE +37776.
 1099   REF  12 LAST 396    20,3672  3 7665 0  DV4CHK    CA      S+ZERO
 1100   REF 157 LAST 399    20,3673  54 001 1            TS      L
 1101   REF  10 LAST 391    20,3674  3 2011 0            CA      DVCON
 1102   REF  55 LAST 399    20,3675  55'371 1            TS      SKEEP1     37776
 1103                      20,3676  0 0006 1             EXTEND
 1104   REF  56 LAST 399   20,3677  11'371 1             DV        SKEEP1
 1105   REF 297 LAST 398   20,3700  4 0000 0             CS        A
 1106   REF  11 LAST 399   20,3701  6 2011 0             AD        DVCON
 1107   REF  45 LAST 399   20,3702  0 2041 0             TC        -1CHK
 1108   REF 158 LAST 399   20,3703  3 0001 0             CA        L              37776
 1109   REF   8 LAST 399   20,3704  6 3432 1             AD        S-MAX
 1110   REF  46 LAST 400   20,3705  0 2041 0             TC        -1CHK

R1111   DIVIDE SAME (ZERO).  THE CONTENTS OF THE A REGISTER AND L REGISTER WILL
R1112   HAVE OPPOSITE SIGNS BEFORE DIVISION.  THE QUOTIENT WILL BE + OR - MAX.,
R1113   DEPENDING UPON THE SIGN OF THE L REGISTER AND THE SIGN OF THE DIVISOR.
R1114   C(L) REMAINS THE SAME BECAUSE IT IS THE DIVIDEND.
 1115   REF  13 LAST 399   20,3706  3 7665 0  DV5CHK     CA        S+ZERO
 1116   REF  57 LAST 400   20,3707  55'371 1             TS        SKEEP1         +0
 1117   REF 159 LAST 400   20,3710  54 001 1             TS        L
 1118   REF 298 LAST 400   20,3711  4 0000 0             CS        A
 1119   REF  31 LAST 399   20,3712  55'372 1             TS        SKEEP2         -0
 1120                      20,3713  0 0006 1  DV5++      EXTEND
 1121   REF  58 LAST 400   20,3714  11'371 1             DV        SKEEP1         +37777, +0
 1122   REF  28 LAST 399   20,3715  55'377 1             TS        SKEEP7         37777
 1123   REF 160 LAST 400   20,3716  3 0001 0             CA        L
 1124   REF   7 LAST 387   20,3717  0 2032 1             TC        +0CHK
 1125   REF 299 LAST 400   20,3720  4 0000 0  DV5+-      CS        A
 1126                      20,3721  0 0006 1             EXTEND
 1127   REF  32 LAST 400   20,3722  11'372 1             DV        SKEEP2         40000, +0
 1128   REF  22 LAST 399   20,3723  55'376 0             TS        SKEEP6         40000
 1129   REF  29 LAST 400   20,3724  6 1377 0             AD        SKEEP7
 1130   REF  19 LAST 399   20,3725  0 2033 0             TC        -0CHK
 1131   REF 300 LAST 400   20,3726  4 0000 0             CS        A
 1132   REF 161 LAST 400   20,3727  56 001 0             XCH       L              ALSO PUT -0 IN L
 1133   REF   8 LAST 400   20,3730  0 2032 1             TC        +0CHK
 1134                      20,3731  0 0006 1  DV5-+      EXTEND
 1135   REF  59 LAST 400   20,3732  11'371 1             DV        SKEEP1         40000, -0
 1136   REF  30 LAST 400   20,3733  6 1377 0             AD        SKEEP7
 1137   REF  20 LAST 400   20,3734  0 2033 0             TC        -0CHK
 1138   REF 162 LAST 400   20,3735  3 0001 0             CA        L
 1139   REF  21 LAST 400   20,3736  0 2033 0             TC        -0CHK
 1140                      20,3737  0 0006 1  DV5--      EXTEND
 1141   REF  33 LAST 400   20,3740  11'372 1             DV        SKEEP2         37777, -0
 1142   REF  23 LAST 400   20,3741  6 1376 1             AD        SKEEP6
 1143   REF  22 LAST 400   20,3742  0 2033 0             TC        -0CHK
 1144   REF 163 LAST 400   20,3743  3 0001 0             CA        L
 1145   REF  23 LAST 400   20,3744  0 2033 0             TC        -0CHK
 1146   REF  24 LAST 400   20,3745  3 1376 1             CA        SKEEP6         CHECK QUOTIENT
 1147   REF  12 LAST 400   20,3746  6 2011 0             AD        DVCON
 1148   REF  47 LAST 400   20,3747  0 2041 0             TC        -1CHK

 1149   REF  11 LAST 398   20,3750  0 4457 0             TC        CHECKNJ        CHECK FOR NEW JOB
 1150   REF  23 LAST 398   20,3751  3 1374 0             CA        SKEEP4
 1151                           20,3752   0 0006 1              EXTEND
 1152    REF    1               20,3753   6 3607 0              BZMF    DVLOOP
 1153    REF    4 LAST 393      20,3754   25'370 1              INCR    SCOUNT +2
 1154    REF    5 LAST 378      20,3755   0 2101 0              TC      SELFCHK                 START SELF-CHECK AGAIN

 1155                                  20,3756  ENDSLFS1 EQUALS

 1156    REF    1                      01,3000              SETLOC ENDFAILS

 1157    REF   60 LAST 400      01,3000   55'371 1  SBNKOPTN TS      SKEEP1
 1158    REF  301 LAST 400      01,3001   4 0000 0              CS      A                       GO TO BACKUP IDLE LOOP IF C(SMODE) IS
 1159    REF   50 LAST 371      01,3002   6 7656 0              AD      TWO                     GREATER THAN OCTAL 11
 1160                           01,3003   0 0006 1              EXTEND
 1161    REF    1               01,3004   6 3013 0              BZMF    TOSMODE -2
 1162    REF   14 LAST 400      01,3005   3 7665 0              CA      S+ZERO                  ZERO SMODE FOR OPTIONS ABOVE 8.
 1163    REF    7 LAST 396      01,3006   55'361 0              TS      SMODE
 1164    REF   61 LAST 401      01,3007   3 1371 0              CA      SKEEP1
 1165    REF  302 LAST 401      01,3010   50 000 1              NDX     A
 1166    REF    1               01,3011   0 3011 1              TC      SOPTON11 -1
 1167    REF    1               01,3012   0 3034 0  SOPTON11    TC      DSKYCHK

 1168    REF   15 LAST 401      01,3013   3 7665 0              CA      S+ZERO
 1169    REF    8 LAST 401      01,3014   55'361 0              TS      SMODE
 1170    REF   21 LAST 378      01,3015   0 4102 0  TOSMODE     TC      POSTJUMP
 1171    REF    9 LAST 398      01,3016    40047 0              CADR    SMODECHK

R1172    THE FOLLOWING CONSTANTS ARE USED BY DSKYCHK.
 1173                           01,3017    05265 0  DSKYCODE    OCTAL   05265                   00
 1174                           01,3020    04143 0              OCTAL   04143                   11
 1175                           01,3021    05471 0              OCTAL   05471                   22
 1176                           01,3022    05573 0              OCTAL   05573                   33
 1177                           01,3023    04757 0              OCTAL   04757                   44
 1178                           01,3024    05736 0              OCTAL   05736                   55
 1179                           01,3025    05634 0              OCTAL   05634                   66
 1180                           01,3026    05163 0              OCTAL   05163                   77
 1181                           01,3027    05675 0              OCTAL   05675                   88
 1182                           01,3030    05777 0              OCTAL   05777                   99
 1183                           01,3031    07265 1  +-ZERO      OCTAL   07265
 1184                           01,3032    00013 0  11DEC.      OCTAL   00013

R1185    BITS 2 AND 6 TURN ON THE COMPUTER ACTIVITY AND VERB-NOUN FLASH.
 1186                           01,3033    00042 1  S11CHAN     OCTAL   00042

 1187    REF    6 LAST 371      01,3034   3 7661 1  DSKYCHK     CAF     TEN
 1188    REF   22 LAST 396      01,3035   55'373 0              TS      SKEEP3
 1189                           01,3036   0 0004 0              INHINT
 1190    REF   23 LAST 396      01,3037   3 7657 1              CAF     S+1                     SET UP TEN MS INTERRUPT
 1191    REF   40 LAST 388      01,3040   0 4536 0              TC      WAITLIST
 1192                           01,3041    03075 0              2CADR   NXTNMBR
C1192    REF    1               01,3042    02003 0
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LINS   AGC BLOCK TWO SELF-CHECK                                                               USER'S OWN PAGE NO.  26

 1193                          01,3043  0 0003 1            RELINT
 1194   REF   2 LAST 401       01,3044  0 3015 0            TC      TOSMODE          GO TO IDLE LOOP

 1195   REF  23 LAST 401       01,3045  55'373 0  SDSPTAB   TS      SKEEP3
 1196                          01,3046  0 0004 0            INHINT
 1197   REF  24 LAST 402       01,3047  51'373 1            NDX     SKEEP3
 1198   REF   1                01,3050  4 3017 0            CS      DSKYCODE
 1199   REF  44 LAST 374       01,3051  54 307 1  SBLANKS   TS      DSPTAB
 1200   REF  45 LAST 402       01,3052  54 310 1            TS      DSPTAB +1
 1201   REF  46 LAST 402       01,3053  54 311 0            TS      DSPTAB +2
 1202   REF  47 LAST 402       01,3054  54 312 0            TS      DSPTAB +3
 1203   REF  48 LAST 402       01,3055  54 313 1            TS      DSPTAB +4
 1204   REF  49 LAST 402       01,3056  54 314 0            TS      DSPTAB +5
 1205   REF  50 LAST 402       01,3057  54 315 1            TS      DSPTAB +6
 1206   REF  51 LAST 402       01,3060  54 316 1            TS      DSPTAB +7
 1207   REF  52 LAST 402       01,3061  54 317 0            TS      DSPTAB +8D
 1208   REF  53 LAST 402       01,3062  54 320 1            TS      DSPTAB +9D
 1209   REF  54 LAST 402       01,3063  54 321 0            TS      DSPTAB +10D
 1210   REF   1                01,3064  3 3032 0            CA      11DEC.
 1211   REF   8 LAST 363       01,3065  54 303 0            TS      NOUT

 1212                          01,3066  0 0004 0  DSKYWAIT  INHINT
 1213   REF  36 LAST 377       01,3067  3 7646 1            CAF     BIT10            5.12 SECOND WAIT
 1214   REF  41 LAST 401       01,3070  0 4536 0            TC      WAITLIST
 1215                          01,3071   03075 0            2CADR   NXTNMBR
C1215   REF   2 LAST 401       01,3072   02003 0
 1216                          01,3073  0 0003 1            RELINT
 1217   REF  33 LAST 389       01,3074  0 4602 1            TC      TASKOVER

 1218   REF  25 LAST 402       01,3075  11'373 0  NXTNMBR   CCS     SKEEP3
 1219   REF   1                01,3076  0 3045 0            TC      SDSPTAB          9 THROUGH 0
 1220   REF   1                01,3077  0 3104 1            TC      -SIGN            -ZEROS
 1221   REF   1                01,3100  0 3121 0            TC      +SIGN            +ZEROS
 1222   REF  34 LAST 400       01,3101  11'372 1            CCS     SKEEP2
 1223   REF   1                01,3102  0 3135 0            TC      NODSPLAY         PUTS BLANKS IN DSKY DISPLAY
 1224   REF   1                01,3103  0 3141 0            TC      LITESOUT         TURN OFF LIGHTS

 1225   REF  24 LAST 401       01,3104  4 7657 0  -SIGN     CS      S+1
 1226   REF  26 LAST 402       01,3105  55'373 0            TS      SKEEP3
 1227   REF   1                01,3106  3 3033 1            CA      S11CHAN          TURN ON VERB-NOUN FLASH
 1228                          01,3107  0 0006 1            EXTEND                   AND COMPUTER ACTIVITY LIGHTS.
 1229   REF  16 LAST 364       01,3110  05 011 1            WOR     DSALMOUT
 1230   REF   1                01,3111  4 3031 1            CS      +-ZERO
 1231                          01,3112  0 0004 0            INHINT
 1232   REF  55 LAST 402       01,3113  54 307 1            TS      DSPTAB
 1233   REF  56 LAST 402       01,3114  54 312 0            TS      DSPTAB +3
 1234   REF  57 LAST 402       01,3115  54 314 0            TS      DSPTAB +5
 1235   REF  13 LAST 377       01,3116  3 6165 0            CAF     THREE
 1236   REF   9 LAST 402       01,3117  54 303 0            TS      NOUT
 1237   REF   1                01,3120  0 3066 1            TC      DSKYWAIT
 1238   REF 141 LAST 377   01,3121  4 7665 1  +SIGN    CS      ZERO
 1239   REF  27 LAST 402   01,3122  55'373 0           TS      SKEEP3
 1240   REF  25 LAST 402   01,3123  3 7657 1           CA      S+1
 1241   REF  35 LAST 402   01,3124  55'372 1           TS      SKEEP2
 1242                      01,3125  0 0004 0           INHINT
 1243   REF   2 LAST 402   01,3126  4 3031 1           CS      +-ZERO
 1244   REF  58 LAST 402   01,3127  54 310 1           TS      DSPTAB +1
 1245   REF  59 LAST 403   01,3130  54 313 1           TS      DSPTAB +4
 1246   REF  60 LAST 403   01,3131  54 315 1           TS      DSPTAB +6
 1247   REF  14 LAST 402   01,3132  3 6165 0           CAF     THREE
 1248   REF  10 LAST 402   01,3133  54 303 0           TS      NOUT
 1249   REF   2 LAST 402   01,3134  0 3066 1           TC      DSKYWAIT

 1250   REF  36 LAST 403   01,3135  55'372 1  NODSPLAY TS      SKEEP2          +0
 1251   REF  18 LAST 377   01,3136  4 7644 1           CS      BIT12           BLANKS
 1252                      01,3137  0 0004 0           INHINT
 1253   REF   1            01,3140  0 3051 0           TC      SBLANKS         PUTS BLANKS IN ALL DISPLAYS

 1254   REF   2 LAST 402   01,3141  4 3033 0  LITESOUT CS      S11CHAN
 1255                      01,3142  0 0006 1           EXTEND
 1256   REF  17 LAST 402   01,3143  03 011 1           WAND    DSALMOUT        TURN OFF COMPUTER ACTIVITY LIGHT.
 1257   REF  34 LAST 402   01,3144  0 4602 1           TC      TASKOVER        END OF DSKYCHK

 1258                               01,3145  ENDSLFS2 EQUALS
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L        INFLIGHT ALIGNMENT ROUTINES                                                            USER'S OWN PAGE NO.   1
 0001    REF    1                  15,2367               SETLOC ENDDNTMS
 0002    REF    3 LAST  22              E5               EBANK= XSM


R0003    CALCGTA COMPUTES THE GYRO TORQUE ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0005    THE INPUT IS THE DESIRED STABLE MEMBER COORDINATES REFERRED TO PRESENT STABLE MEMBER COORDINATES. THE THREE
R0007    HALF-UNIT VECTORS ARE STORED AT XDC, YDC, AND ZDC.

R0008    THE OUTPUTS ARE THE THREE GYRO TORQUING ANGLES TO BE APPLIED TO THE Y, Z, AND X GYROS AND ARE STORED DP AT IGC,
R0010    MGC, AND OGC RESPECTIVELY. ANGLES ARE SCALED PROPERLY FOR IMUPULSE.


 0011                          15,2367   71230 0  CALCGTA  ITA     DLOAD            PUSHDOWN  00,02,16D,18D,22D-26D,32D-36D
 0012    REF    1              15,2370   00051 0                   S2               XDC = (XD1 XD2 XD3)
 0013    REF    6 LAST  22     15,2371   01423 0                   XDC              YDC = (YD1 YD2 YD3)
 0014                          15,2372   65325 0           PDDL    PDDL             ZDC = (ZD1 ZD2 ZD3)
 0015    REF    1              15,2373   33042 1                   ZERODP
 0016    REF    7 LAST 404     15,2374   01427 1                   XDC +4
 0017                          15,2375   55476 1           DCOMP   VDEF
 0018                          15,2376   77656 1           UNIT
 0019    REF    1              15,2377   06027 1           STODL   ZPRIME           ZP = UNIT(-XD3 0 XD1) = (ZP1 ZP2 ZP3)
 0020    REF    2 LAST 404     15,2400   00027 1                   ZPRIME

 0021                          15,2401   77742 0           SR1
 0022    REF    1              15,2402   06023 0           STODL   SINTH            SIN(IGC) = ZP1
 0023    REF    3 LAST 404     15,2403   00033 1                   ZPRIME +4
 0024                          15,2404   77742 0           SR1
 0025    REF    1              15,2405   36021 1           STCALL  COSTH            COS(IGC) = ZP3
 0026    REF    1              15,2406   32440 0                   ARCTRIG

 0027    REF    1              15,2407   07503 0           STODL   IGC              Y GYRO TORQUING ANGLE   FRACTION OF REV.
 0028    REF    8 LAST 404     15,2410   01425 0                   XDC +2
 0029                          15,2411   77742 0           SR1
 0030    REF    2 LAST 404     15,2412   06023 0           STODL   SINTH            SIN(MGC) = XD2
 0031    REF    4 LAST 404     15,2413   00027 1                   ZPRIME

 0032                          15,2414   65205 0           DMP     PDDL
 0033    REF    9 LAST 404     15,2415   01427 1                   XDC +4           PD00 = (ZP1)(XD3)
 0034    REF    5 LAST 404     15,2416   00033 1                   ZPRIME +4

 0035                          15,2417   45205 1           DMP     DSU
 0036    REF   10 LAST 404     15,2420   01423 0                   XDC              MPAC = (ZP3)(XD1)
 0037                          15,2421   77626 0           STADR
 0038    REF    2 LAST 404     15,2422   41756 0           STCALL  COSTH            COS(MGC) = MPAC - PD00
 0039    REF    2 LAST 404     15,2423   32440 0                   ARCTRIG

 0040    REF    1              15,2424   23505 0           STOVL   MGC              Z GYRO TORQUING ANGLE   FRACTION OF REV.
 0041    REF    6 LAST 404     15,2425   00027 1                   ZPRIME
 0042                          15,2426    77641 1         DOT
 0043    REF    1              15,2427    01437 0                 ZDC
 0044    REF    3 LAST 404     15,2430    22021 1         STOVL   COSTH             COS(OGC) = ZP . ZDC
 0045    REF    7 LAST 404     15,2431    00027 1                 ZPRIME
 0046                          15,2432    77641 1         DOT
 0047    REF    1              15,2433    01431 0                 YDC
 0048    REF    3 LAST 404     15,2434    36023 0         STCALL  SINTH             SIN(OGC) = ZP . YDC
 0049    REF    3 LAST 404     15,2435    32440 0                 ARCTRIG

 0050    REF    2 LAST 258     15,2436    37501 1         STCALL  OGC               X GYRO TORQUING ANGLE   FRACTION OF REV.
 0051    REF    2 LAST 404     15,2437    00051 0                 S2
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L          INFLIGHT ALIGNMENT ROUTINES                                                USER'S OWN PAGE NO.   3

R0052      ARCTRIG COMPUTES AN ANGLE GIVEN THE SINE AND COSINE OF THIS ANGLE.

R0053      THE INPUTS ARE SIN/4 AND COS/4 STORED DP AT SINTH AND COSTH.

R0054      THE OUTPUT IS THE CALCULATED ANGLE BETWEEN +.5 AND -.5 REVOLUTIONS AND STORED AT THETA. THE OUTPUT IS ALSO
R0056      AVAILABLE AT MPAC.


 0057                           15,2440    51545 1  ARCTRIG  DLOAD   ABS                  PUSHDOWN  16D,18D,20D,22D-26D
 0058      REF    4 LAST 405    15,2441    00023 0                   SINTH
 0059                           15,2442    50025 0           DSU     BMN
 0060      REF    1             15,2443    33030 1                   QTSN45               ABS(SIN/4) - SIN(45)/4
 0061      REF    1             15,2444    32453 1                   TRIG1                IF (-45,45) OR (135,-135)


 0062                           15,2445    72545 0           DLOAD   SL1                  (45,135) OR (-135,-45)
 0063      REF    4 LAST 405    15,2446    00021 1                   COSTH
 0064                           15,2447    75326 1           ACOS    SIGN
 0065      REF    5 LAST 406    15,2450    00023 0                   SINTH
 0066      REF    1             15,2451    00025 0           STORE   THETA                X = ARCCOS(COS) WITH SIGN(SIN)
 0067                           15,2452    77616 0           RVQ


 0068                           15,2453    72545 0  TRIG1    DLOAD   SL1                  (-45,45) OR (135,-135)
 0069      REF    6 LAST 406    15,2454    00023 0                   SINTH
 0070                           15,2455    77736 0           ASIN
 0071      REF    2 LAST 406    15,2456    06025 0           STODL   THETA                X = ARCSIN(SIN) WITH SIGN(SIN)
 0072      REF    5 LAST 406    15,2457    00021 1                   COSTH
 0073                           15,2460    77640 0           BMN
 0074      REF    1             15,2461    32464 0                   TRIG2                IF (135,-135)

 0075                           15,2462    43545 1           DLOAD   RVQ
 0076      REF    3 LAST 406    15,2463    00025 0                   THETA                X = ARCSIN(SIN)     (-45,45)


 0077                           15,2464    75345 1  TRIG2    DLOAD   SIGN                 (135,-135)
 0078      REF    1             15,2465    33032 0                   HALFDP
 0079      REF    7 LAST 406    15,2466    00023 0                   SINTH
 0080                           15,2467    77625 0           DSU
 0081      REF    4 LAST 406    15,2470    00025 0                   THETA
 0082      REF    5 LAST 406    15,2471    00025 0           STORE   THETA                X = .5 WITH SIGN(SIN) - ARCSIN(SIN)
 0083                           15,2472    77616 0           RVQ                                      (+) - (+) OR (-) - (-)
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R0084    SMNB TRANSFORMS A STAR DIRECTION FROM STABLE MEMBER TO NAVIGATION BASE COORDINATES.

R0086    THE INPUTS ARE  1) THE STAR VECTOR REFERRED TO PRESENT STABLE MEMBER COORDINATES STORED AT LOCATION 32D OF THE
R0088    VAC AREA.  2) THE GIMBAL ANGLES (CDUY,CDUZ,CDUX) STORED AT ALTERNATING LOCATIONS RESPECTIVELY. THE ANGLES ARE
R0090    USUALLY STORED AT LOCATIONS 2,4, AND 6 OF THE MARK VAC AREA. THEY CAN BE STORED AT LOCATIONS 20,22, AND 24 OF
R0092    YOUR JOB VAC AREA.  3) THE BASE ADDRESS OF THE GIMBAL ANGLES STORED SP AT LOCATION S1 OF YOUR JOB VAC AREA.

R0094    THE OUTPUT IS THE STAR VECTOR REFERRED TO NAVIGATION BASE COORDINATES STORED AT 32D OF THE VAC AREA. THE OUTPUT
R0096    IS ALSO AVAILABLE AT MPAC.


 0097                          15,2473   43030 0  SMNB      ITA     CLEAR              PUSHDOWN  00,02,04-10D,30D,32D-36D
 0098    REF    3 LAST 405     15,2474   00051 0                    S2
 0099    REF    1              15,2475   00264 1                    NBSMBIT            SET NBSMBIT = 0

 0100                          15,2476   77170 1  SMNB1     AXT,1   AXT,2              ROTATE X,Z, ABOUT Y
 0101                          15,2477   00004 0                    4
 0102                          15,2500   00000 1                    0
 0103                          15,2501   77634 0            CALL
 0104    REF    1              15,2502   32543 1                    AXISROT

 0105                          15,2503   77170 1            AXT,1   AXT,2              ROTATE Y,X ABOUT  Z
 0106                          15,2504   00002 0                    2
 0107                          15,2505   00004 0                    4
 0108                          15,2506   77634 0            CALL
 0109    REF    2 LAST 407     15,2507   32543 1                    AXISROT

 0110                          15,2510   77170 1            AXT,1   AXT,2              ROTATE Z,Y ABOUT  X
 0111                          15,2511   00000 1                    0
 0112                          15,2512   00002 0                    2
 0113                          15,2513   77634 0            CALL
 0114    REF    3 LAST 407     15,2514   32543 1                    AXISROT

 0115                          15,2515   77650 1            GOTO
 0116    REF    4 LAST 407     15,2516   00051 0                    S2
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L          INFLIGHT ALIGNMENT ROUTINES                                                   USER'S OWN PAGE NO.   5

R0117      NBSM TRANSFORMS A STAR DIRECTION FROM NAVIGATION BASE TO STABLE MEMBER  COORDINATES.

R0119      THE INPUTS ARE  1) THE STAR VECTOR REFERRED TO NAVIGATION BASE COORDINATES STORED AT LOCATION 32D OF THE VAC
R0121      AREA.  2) THE GIMBAL ANGLES (CDUY,CDUZ,CDUX) STORED AT ALTERNATING LOCATIONS RESPECTIVELY. THE ANGLES ARE
R0123      USUALLY STORED AT LOCATIONS 2,4, AND 6 OF THE MARK VAC AREA. THEY CAN BE STORED AT LOCATIONS 20,22, AND 24 OF
R0125      YOUR JOB VAC AREA.  3) THE BASE ADDRESS OF THE GIMBAL ANGLES STORED SP AT LOCATION S1 OF YOUR JOB VAC AREA.

R0127      THE OUTPUT IS THE STAR VECTOR REFERRED TO PRESENT STABLE MEMBER COORDINATES STORED AT LOCATION 32D OF THE VAC
R0129      AREA. THE OUTPUT IS ALSO AVAILABLE AT MPAC.


 0130                            15,2517   43030 0  NBSM      ITA      SET                PUSHDOWN  00,02,04-10D,30D,32D-36D
 0131     REF    5 LAST 407      15,2520   00051 0                     S2
 0132     REF    2 LAST 407      15,2521   00064 0                     NBSMBIT            SET NBSMBIT = 1

 0133                            15,2522   77170 1  NBSM2     AXT,1    AXT,2              ROTATE Z,Y ABOUT  X
 0134                            15,2523   00000 1                     0
 0135                            15,2524   00002 0                     2
 0136                            15,2525   77634 0            CALL
 0137     REF    4 LAST 407      15,2526   32543 1                     AXISROT

 0138                            15,2527   77170 1            AXT,1    AXT,2              ROTATE Y,X ABOUT  Z
 0139                            15,2530   00002 0                     2
 0140                            15,2531   00004 0                     4
 0141                            15,2532   77634 0            CALL
 0142     REF    5 LAST 408      15,2533   32543 1                     AXISROT

 0143                            15,2534   77170 1            AXT,1    AXT,2              ROTATE X,Z, ABOUT Y
 0144                            15,2535   00004 0                     4
 0145                            15,2536   00000 1                     0
 0146                            15,2537   77634 0            CALL
 0147     REF    6 LAST 408      15,2540   32543 1                     AXISROT

 0148                            15,2541   77650 1            GOTO
 0149     REF    6 LAST 408      15,2542   00051 0                     S2
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L         INFLIGHT ALIGNMENT ROUTINES                                              USER'S OWN PAGE NO.   6

R0150     AXISROT IS UTILIZED BY THE SMNB AND NBSM ROUTINES. SEE REMARKS ON THESE ROUTINES FOR INPUTS AND OUTPUTS.


 0152                          15,2543    66660 1  AXISROT   XSU,1   SLOAD*
 0153     REF   4 LAST 242     15,2544    00050 1                    S1                        SMNB              .          NBSM
 0154                          15,2545    00005 1                    4,1               IG       MG       OG     .   OG      MG       IG
 0155                          15,2546    56024 1            RTB     XAD,1
 0156     REF   3 LAST 243     15,2547    33345 0                    CDULOGIC
 0157     REF   5 LAST 409     15,2550    00050 1                    S1
 0158                          15,2551    00037 0            STORE   30D

 0159                          15,2552    77746 1  ACCUROT   COS
 0160                          15,2553    10011 0            STODL   8D,1                                    COS(ANGLE)
 0161                          15,2554    00037 0                    30D
 0162                          15,2555    77756 0            SIN
 0163                          15,2556    02013 1            STORE   10D,1                                   SIN(ANGLE)

 0164                          15,2557    72403 0            DMP*    SL1
 0165                          15,2560    77732 1                    32D +4,2
 0166                          15,2561    40723 0            PDDL*   DMP*                                PD0
 0167                          15,2562    00011 1                    8D,1              S3SIN S1SIN S2SIN  .  S2SIN S1SIN S3SIN
 0168                          15,2563    77732 1                    32D +4,2

 0169                          15,2564    64752 0            SL1     PDDL*                               PD2
 0170                          15,2565    00013 0                    10D,1             S3COS S1COS S2COS  .  S2COS S1COS S3COS

 0171                          15,2566    72403 0            DMP*    SL1                                MPAC
 0172                          15,2567    00045 0                    32D +4,1          S1SIN S2SIN S3SIN  .  S3SIN S2SIN S1SIN

 0173                          15,2570    77614 1            BOFF
 0174     REF   3 LAST 408     15,2571    00344 1                    NBSMBIT
 0175     REF   1              15,2572    32604 1                    AXISROT1

 0176                          15,2573    45421 1            BDSU    STADR                                    .     PD2 - MPAC
 0177                          15,2574    57732 0            STODL*  32D +4,2                                 .  S2      S1      S3
 0178                          15,2575    00011 1                    8D,1

 0179                          15,2576    72403 0            DMP*    SL1                                      .       MPAC
 0180                          15,2577    00045 0                    32D +4,1                                 .  S3COS S2COS S1COS

 0181                          15,2600    45415 0            DAD     STADR                                    .     PD0 + MPAC
 0182                          15,2601    53732 1            STOVL   32D +4,1                                 .  S3      S2      S1
 0183                          15,2602    00041 1                    32D
 0184                          15,2603    77616 0            RVQ

 0185                          15,2604    45415 0  AXISROT1  DAD     STADR                MPAC + PD2          .
 0186                          15,2605    57732 0            STODL*  32D +4,2          S3      S1      S2     .
 0187                          15,2606    00011 1                    8D,1
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0188                        15,2607   72403 0          DMP*     SL1                  MPAC           .
0189                        15,2610   00045 0                   32D +4,1           S1COS S2COS S3COS .

0190                        15,2611   45425 0          DSU      STADR                MPAC - PD0     .
0191                        15,2612   53732 1          STOVL    32D +4,1           S1     S2     S3   .
0192                        15,2613   00041 1                   32D
0193                        15,2614   77616 0          RVQ
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R0194   CALCGA COMPUTES THE CDU DRIVING ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0196   THE INPUTS ARE  1) THE NAVIGATION BASE COORDINATES REFERRED TO ANY COORDINATE SYSTEM. THE THREE HALF-UNIT
R0198   VECTORS ARE STORED AT XNB,YNB, AND ZNB.  2) THE DESIRED STABLE MEMBER COORDINATES REFERRED TO THE SAME
R0200   COORDINATE SYSTEM ARE STORED AT XSM, YSM, AND ZSM.

R0201   THE OUTPUTS ARE THE THREE CDU DRIVING ANGLES AND ARE STORED SP AT THETAD, THETAD +1, AND THETAD +2.


 0203                          15,2615   47375 0  CALCGA   VLOAD  VXV             PUSHDOWN  00-04,16D,18D
 0204   REF    1               15,2616   01423 0                  XNB             XNB = OGA (OUTER GIMBAL AXIS)
 0205   REF    1               15,2617   01407 0                  YSM             YSM = IGA (INNER GIMBAL AXIS)
 0206                          15,2620   41456 0           UNIT   PUSH            PDO = UNIT(OGA X IGA) = MGA

 0207                          15,2621   46041 0           DOT    ITA
 0208   REF    1               15,2622   01437 0                  ZNB
 0209   REF    7 LAST 408      15,2623   00051 0                  S2
 0210   REF    6 LAST 406      15,2624   22021 1           STOVL  COSTH           COS(OG) = MGA . ZNB
 0211                          15,2625   00001 0                  0
 0212                          15,2626   77641 1           DOT
 0213   REF    1               15,2627   01431 0                  YNB
 0214   REF    8 LAST 406      15,2630   36023 0           STCALL SINTH           SIN(OG) = MGA . YNB
 0215   REF    4 LAST 405      15,2631   32440 0                  ARCTRIG
 0216   REF    3 LAST 405      15,2632   23501 1           STOVL  OGC
 0217                          15,2633   00001 0                  0

 0218                          15,2634   50235 0           VXV    DOT             PROVISION FOR MG ANGLE OF 90 DEGREES
 0219   REF    2 LAST 411      15,2635   01423 0                  XNB
 0220   REF    2 LAST 411      15,2636   01407 0                  YSM
 0221                          15,2637   77752 1           SL1
 0222   REF    7 LAST 411      15,2640   22021 1           STOVL  COSTH           COS(MG) = IGA . (MGA X OGA)
 0223   REF    3 LAST 411      15,2641   01407 0                  YSM
 0224                          15,2642   77641 1           DOT
 0225   REF    3 LAST 411      15,2643   01423 0                  XNB
 0226   REF    9 LAST 411      15,2644   36023 0           STCALL SINTH           SIN(MG) = IGA . OGA
 0227   REF    5 LAST 411      15,2645   32440 0                  ARCTRIG
 0228   REF    2 LAST 404      15,2646   01505 0           STORE  MGC

 0229                          15,2647   45246 0           ABS    DSU
 0230   REF    1               15,2650   33050 1                  .166...
 0231                          15,2651   77644 1           BPL
 0232   REF    1               15,2652   32671 0                  GIMLOCK1        IF ANGLE GREATER THAN 60 DEGREES

 0233                          15,2653   50375 0  CALCGA1  VLOAD  DOT
 0234   REF    1               15,2654   01415 0                  ZSM
 0235                          15,2655   00001 0                  0
 0236   REF    8 LAST 411      15,2656   22021 1           STOVL  COSTH           COS(IG) = ZSM . MGA
 0237   REF    4 LAST 404      15,2657   01401 0                  XSM
 0238                      15,2660   45441 1            DOT     STADR
 0239   REF  10 LAST 411   15,2661   41754 1            STCALL  SINTH         SIN(IG) = XSM . MGA
 0240   REF   6 LAST 411   15,2662   32440 0                    ARCTRIG

 0241   REF   2 LAST 404   15,2663   23503 0            STOVL   IGC
 0242   REF   4 LAST 411   15,2664   01501 1                    OGC
 0243                      15,2665   77624 1            RTB
 0244   REF   1            15,2666   33414 0                    V1STO2S
 0245   REF   8 LAST 376   15,2667   36401 1            STCALL  THETAD
 0246   REF   8 LAST 411   15,2670   00051 0                    S2

 0247                      15,2671   77776 1  GIMLOCK1  EXIT
 0248   REF  26 LAST 378   15,2672  0 5413 1            TC      ALARM
 0249                      15,2673   00401 1            OCT     00401
 0250   REF   9 LAST 283   15,2674  0 6000 1            TC      INTPRET
 0251                      15,2675   77650 1            GOTO
 0252   REF   1            15,2676   32653 0                    CALCGA1
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R0253   AXISGEN COMPUTES THE COORDINATES OF ONE COORDINATE SYSTEM REFERRED TO ANOTHER COORDINATE SYSTEM.

R0255   THE INPUTS ARE  1) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM A STORED AT STARAD.  2) THE STAR2 VECTOR
R0257   REFERRED TO COORDINATE SYSTEM A STORED AT STARAD +6.  3) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM B STORED
R0259   AT LOCATION 6 OF THE VAC AREA.  4) THE STAR2 VECTOR REFERRED TO COORDINATE SYSTEM B STORED AT LOCATION 12D OF
R0261   THE VAC AREA.

R0262   THE OUTPUT DEFINES COORDINATE SYSTEM A REFERRED TO COORDINATE SYSTEM B. THE THREE HALF-UNIT VECTORS ARE STORED
R0264   AT LOCATIONS XDC, XDC +6, XDC +12D, AND STARAD, STARAD +6, STARAD +12D.


 0265                       15,2677   66370 0  AXISGEN   AXT,1   SSP               PUSHDOWN  00-22D,24D-28D,30D
 0266   REF   1             15,2700   01452 0                    STARAD +6
 0267   REF   6 LAST 409    15,2701   00051 0                    S1
 0268   REF   2 LAST 413    15,2702   01436 1                    STARAD -6

 0269                       15,2703   46773 0  AXISGEN1  VLOAD*  VXV*              06D   UA = S1
 0270   REF   3 LAST 413    15,2704   01461 0                    STARAD +12D,1             STARAD +00D   UB = S1
 0271   REF   4 LAST 413    15,2705   01467 0                    STARAD +18D,1
 0272                       15,2706   77656 1            UNIT                      12D   VA = UNIT(S1 X S2)
 0273   REF   5 LAST 413    15,2707   33467 1            STOVL*  STARAD +18D,1             STARAD +06D   VB = UNIT(S1 X S2)
 0274   REF   6 LAST 413    15,2710   01461 0                    STARAD +12D,1

 0275                       15,2711   76433 1            VXV*    VSL1
 0276   REF   7 LAST 413    15,2712   01467 0                    STARAD +18D,1     18D   WA = UA X VA
 0277   REF   8 LAST 413    15,2713   03475 1            STORE   STARAD +24D,1             STARAD +12D   WB = UB X VB

 0278                       15,2714   77700 0            TIX,1
 0279   REF   1             15,2715   32703 1                    AXISGEN1

 0280                       15,2716   66160 0            AXC,1   SXA,1
 0281                       15,2717   00006 1                    6
 0282                       15,2720   00036 1                    30D

 0283                       15,2721   66370 0            AXT,1   SSP
 0284                       15,2722   00022 1                    18D
 0285   REF   7 LAST 413    15,2723   00051 0                    S1
 0286                       15,2724   00006 1                    6

 0287                       15,2725   66374 1            AXT,2   SSP
 0288                       15,2726   00006 1                    6
 0289   REF   9 LAST 412    15,2727   00052 0                    S2
 0290                       15,2730   00002 0                    2

 0291                       15,2731   76720 0  AXISGEN2  XCHX,1  VLOAD*
 0292                       15,2732   00036 1                    30D               X1=-6 X2=+6    X1=-6 X2=+4    X1=-6 X2=+2
 0293                       15,2733   00001 0                    0,1
 0294                       15,2734   62757 0            VXSC*   PDVL*             J=(UA)(UB1)    J=(UA)(UB2)    J=(UA)(UB3)
 0295   REF   9 LAST 413    15,2735   76324 0                    STARAD +6,2
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L       INFLIGHT ALIGNMENT ROUTINES                                                   USER'S OWN PAGE NO.  11

 0296                          15,2736   00007 0                  6,1
 0297                          15,2737   77757 1            VXSC*
 0298   REF  10 LAST 413       15,2740   76316 1                  STARAD +12D,2
 0299                          15,2741   30031 0            STOVL* 24D               K=(VA)(VB1)    J=(VA)(VB2)    J=(VA)(VB3)
 0300                          15,2742   00015 0                  12D,1

 0301                          15,2743   53357 0            VXSC*  VAD
 0302   REF  11 LAST 414       15,2744   76310 1                  STARAD +18D,2     L=(WA)(WB1)    J=(WA)(WB2)    J=(WA)(WB3)
 0303                          15,2745   76455 1            VAD    VSL1
 0304                          15,2746   00031 0                  24D
 0305                          15,2747   77720 1            XCHX,1
 0306                          15,2750   00036 1                  30D
 0307   REF  11 LAST 404       15,2751   03445 1            STORE  XDC +18D,1        XDC = L+J+K    YDC = L+J+K    ZDC = L+J+K

 0308                          15,2752   77700 0            TIX,1
 0309   REF   1                15,2753   32754 0                  AXISGEN3

 0310                          15,2754   77704 1  AXISGEN3  TIX,2
 0311   REF   1                15,2755   32731 0                  AXISGEN2

 0312                          15,2756   77775 1            VLOAD
 0313   REF  12 LAST 414       15,2757   01423 0                  XDC
 0314   REF  12 LAST 414       15,2760   23445 0            STOVL  STARAD
 0315   REF   2 LAST 405       15,2761   01431 0                  YDC
 0316   REF  13 LAST 414       15,2762   23453 1            STOVL  STARAD +6
 0317   REF   2 LAST 405       15,2763   01437 0                  ZDC
 0318   REF  14 LAST 414       15,2764   01461 0            STORE  STARAD +12D

 0319                          15,2765   77616 0            RVQ
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R0418   TRANSPSE COMPUTES THE TRANSPOSE OF A MATRIX (TRANSPOSE = INVERSE OF ORTHOGONAL TRANSFORMATION).

R0420   THE INPUT IS A MATRIX DEFINING COORDINATE SYSTEM A WITH RESPECT TO COORDINATE SYSTEM B STORED IN STARAD THRU
R0422   STARAD +17D.

R0423   THE OUTPUT IS A MATRIX DEFINING COORDINATE SYSTEM B WITH RESPECT TO COORDINATE SYSTEM A STORED IN STARAD THRU
R0425   STARAD +17D.

 0426   REF  15 LAST 414      15,2766   53'447 0  TRANSPSE DXCH    STARAD +2       PUSHDOWN  NONE
 0427   REF  16 LAST 415      15,2767   53'453 0           DXCH    STARAD +6
 0428   REF  17 LAST 415      15,2770   53'447 0           DXCH    STARAD +2

 0429   REF  18 LAST 415      15,2771   53'451 1           DXCH    STARAD +4
 0430   REF  19 LAST 415      15,2772   53'461 1           DXCH    STARAD +12D
 0431   REF  20 LAST 415      15,2773   53'451 1           DXCH    STARAD +4

 0432   REF  21 LAST 415      15,2774   53'457 1           DXCH    STARAD +10D
 0433   REF  22 LAST 415      15,2775   53'463 0           DXCH    STARAD +14D
 0434   REF  23 LAST 415      15,2776   53'457 1           DXCH    STARAD +10D
 0435   REF  50 LAST 122      15,2777   1 6014 0           TCF     DANZIG


R0436   SMD/EREF TRANSFORMS STABLE MEMBER DESIRED COORDINATES FROM STABLE MEMBER DESIRED (DESIRED = PRESENT HERE) TO
R0438   EARTH REFERENCE COORDINATES TO ALIGN THE STABLE MEMBER TO SPECIFIED GIMBAL ANGLES.

R0440   THE INPUTS ARE 1) THE MATRIX DEFINING THE EARTH REFERENCE COORDINATE FRAME WITH RESPECT TO THE NAVIGATION BASE
R0442   COORDINATE FRAME, 2) SAME AS 2) AND 3) OF SMNB.

R0443   THE OUTPUT IS THE DESIRED STABLE MEMBER COORDINATES WITH RESPECT TO THE EARTH REFERENCE COORDINATE FRAME. THE
R0445   THREE UNIT VECTORS ARE STORED AT XSM, YSM, AND ZSM.

 0446                         15,3000   77230 0  SMD/EREF ITA      VLOAD           PUSHDOWN  00,02,04-10D,30D,32D-36D
 0447                         15,3001   00014 1                    12D
 0448   REF   1               15,3002   33040 0                    XUNIT
 0449                         15,3003   36041 1           STCALL   32D
 0450   REF   3 LAST 242      15,3004   32473 0                    SMNB            STABLE MEMBER TO NAVIGATION BASE
 0451                         15,3005   76521 0           MXV      VSL1
 0452   REF  24 LAST 415      15,3006   01445 0                    STARAD          THEN TO EARTH REFERENCE
 0453   REF   5 LAST 411      15,3007   23401 0           STOVL    XSM
 0454   REF   1               15,3010   33036 1                    YUNIT

 0455                         15,3011   36041 1           STCALL   32D
 0456   REF   4 LAST 415      15,3012   32473 0                    SMNB            STABLE MEMBER TO NAVIGATION BASE
 0457                         15,3013   76521 0           MXV      VSL1
 0458   REF  25 LAST 415      15,3014   01445 0                    STARAD          THEN TO EARTH REFERENCE
 0459   REF   4 LAST 411      15,3015   23407 0           STOVL    YSM
 0460   REF   1               15,3016   33034 0                    ZUNIT

 0461                         15,3017   36041 1           STCALL   32D
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L      INFLIGHT ALIGNMENT ROUTINES                                                        USER'S OWN PAGE NO. 13

 0462  REF   5 LAST 415    15,3020   32473 0                   SMNB             STABLE MEMBER TO NAVIGATION BASE
 0463                      15,3021   76521 0            MXV    VSL1
 0464  REF  26 LAST 415    15,3022   01445 0                   STARAD           THEN TO EARTH REFERENCE
 0465  REF   2 LAST 411    15,3023   37415 0            STCALL ZSM
 0466                      15,3024   00014 1                   12D

 0467                      15,3025   67777 1  270DEG    2DEC   -.25
C0467                      15,3026   77777 0
 0468                      15,3027   05520 0  QTSN45    2DEC   .1768
C0468                      15,3030   26075 1
 0469                      15,3031   20000 0  HALFDP    2DEC   .5
C0469                      15,3032   00000 1
 0470                      15,3033   00000 1  ZUNIT     2DEC   0
C0470                      15,3034   00000 1
 0471                      15,3035   00000 1  YUNIT     2DEC   0
C0471                      15,3036   00000 1
 0472                      15,3037   20000 0  XUNIT     2DEC   0.5
C0472                      15,3040   00000 1
 0473                      15,3041   00000 1  ZERODP    2DEC   0
C0473                      15,3042   00000 1
 0474                      15,3043   00000 1            2DEC   0
C0474                      15,3044   00000 1
 0475                      15,3045   00000 1            2DEC   0
C0475                      15,3046   00000 1
 0476                      15,3047   05252 1  .166...   2DEC   .1666666667
C0476                      15,3050   25253 1
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L       INFLIGHT ALIGNMENT ROUTINES                                                   USER'S OWN PAGE NO.  14

P0477   AOTNB CONVERTS THE TWO RETICLE ROTATION ANGLES (YROT AND SROT) AND
R0478   THE DETENT SETTING TO A HALF UNIT STAR VECTOR REFERRED TO THE
R0479   NAVIGATION BASE.
R0480
R0481   THE INPUTS ARE
R0482
R0483      Y RET. LINE RATATION S(YROT) STORED IN LOC 3 OF THE MARK VAC AREA
R0484      SPIRAL ROTATION ANGLE S(SROT) STORED IN LOC 5 OF MARK VAC AREA
R0485      ANGLE OF CENTER OF FIELD OF VIEW S(ELV) STORED IN LOC 9 OF MARK VAC
R0486      AOT ASZIMUTH ANGLE S(DET) STORED IN LOC 8 OF MARK VAC AREA
R0487      THE COMPLEMENT OF BASE ADDRESS OF MARK VAC IS STORED AT X1
R0488
R0489   THE OUTPUT IS A HALF UNIT STAR VECTOR IN NB COORDINATES STORED
R0490   AT 32D AND AVAILABLE IN VAC ON RETURN TO THE CALLING PROGRAM
R0491
 0492                          15,3051   66601 0  AOTNB     SETPD  SLOAD*
 0493                          15,3052   00001 0                   0
 0494                          15,3053   00004 0                   3,1
 0495                          15,3054   41424 0            RTB    PUSH
 0496   REF    4 LAST 409      15,3055   33345 0                   CDULOGIC
 0497                          15,3056   00017 1            STORE  14D
 0498                          15,3057   65346 0            COS    PDDL
 0499                          15,3060   41556 1            SIN    PUSH
 0500                          15,3061   45133 1            SLOAD* RTB
 0501                          15,3062   00006 1                   5,1
 0502   REF    5 LAST 417      15,3063   33345 0                   CDULOGIC
 0503                          15,3064   00021 1            STORE  16D              STORE S IF S AND Y ARE ZERO, S=0
 0504                          15,3065   52054 1            BZE    GOTO             S NOT ZERO
 0505   REF    1               15,3066   33070 0                   SISZ             S=0
 0506   REF    1               15,3067   33100 0                   SCOMP
 0507                          15,3070   53145 1  SISZ      DLOAD  BZE              IS Y ZERO
 0508                          15,3071   00017 1                   14D
 0509   REF    1               15,3072   33075 0                   YISZ             Y=0
 0510                          15,3073   77650 1            GOTO
 0511   REF    2 LAST 417      15,3074   33100 0                   SCOMP
 0512                          15,3075   52145 0  YISZ      DLOAD  GOTO
 0513   REF    2 LAST 404      15,3076   33042 1                   ZERODP
 0514   REF    1               15,3077   33105 0                   SGOT
 0515                          15,3100   45345 1  SCOMP     DLOAD  DSU
 0516                          15,3101   00017 1                   14D
 0517                          15,3102   00021 1                   16D              Y-S
 0518                          15,3103   77621 1            BDSU
 0519   REF    1               15,3104   33172 0                   NEARONE          S=360-(Y-S)
 0520                          15,3105   41405 0  SGOT      DMP    PUSH
 0521   REF    1               15,3106   33170 1                   DP1/12
 0522                          15,3107   65346 0            COS    PDDL
 0523                          15,3110   41556 1            SIN    PUSH
 0524                          15,3111   72405 0            DMP    SLI
 0525                          15,3112   00001 0                   0
 0526                          15,3113   06001 0            STODL  0
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4592

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0527                    15,3114   00003 1              2
0528                    15,3115   45405 1     DMP      STADR
0529                    15,3116   77774 0     STORE    2

0530                    15,3117   45133 1     SLOAD*   RTB
0531                    15,3120   00012 1              9D,1
0532  REF   6 LAST 417  15,3121   33345 0              CDULOGIC
0533                    15,3122   73406 1     PUSH     SIN
0534                    15,3123   71525 0     PDDL     COS
0535                    15,3124   41206 0     PUSH     DMP
0536                    15,3125   00001 0              0
0537                    15,3126   41325 0     PDDL     DMP
0538                    15,3127   00005 1              4
0539                    15,3130   00007 0              6
0540                    15,3131   72415 1     DAD      SL1
0541                    15,3132   77626 0     STADR
0542                    15,3133   71736 0     STODL    32D

0543                    15,3134   77605 1     DMP
0544                    15,3135   00005 1              4
0545                    15,3136   06005 1     STODL    4

0546                    15,3137   44205 0     DMP      BDSU
0547                    15,3140   00001 0              0
0548                    15,3141   66606 1     PUSH     SLOAD*
0549                    15,3142   00011 1              8D,1
0550                    15,3143   41424 0     RTB      PUSH
0551  REF   7 LAST 418  15,3144   33345 0              CDULOGIC
0552                    15,3145   65346 0     COS      PDDL
0553                    15,3146   77756 0     SIN
0554                    15,3147   00001 0     STORE    0

0555                    15,3150   65205 0     DMP      PDDL
0556                    15,3151   00005 1              4
0557                    15,3152   00007 0              6
0558                    15,3153   43205 1     DMP      DAD
0559                    15,3154   00003 1              2
0560                    15,3155   77712 0     SL2
0561                    15,3156   06043 0     STODL    34D

0562                    15,3157   45405 1     DMP      STADR
0563                    15,3160   71732 1     STODL    36D

0564                    15,3161   77605 1     DMP
0565                    15,3162   62421 1     BDSU     SL2
0566                    15,3163   00045 0              36D
0567                    15,3164   22045 0     STOVL    36D
0568                    15,3165   00041 1              32D
0569                    15,3166   77616 0     RVQ
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 0570                    15,3167   02525 1  DP1/12    2DEC    .0833333333
C0570                    15,3170   12525 0
 0571                    15,3171   37777 1  NEARONE   2DEC    .999999999
C0571                    15,3172   37777 1
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P0572    AOTSM CALCULATES A HALF UNIT STAR VECTOR IN STABLE MEMBER COORDINATES
R0573    FROM TWO PLANES CONTAINING THE STAR REFERRED TO NB
R0574
R0575    THE INPUTS ARE
R0576
R0577      AOT AZIMUTH AND ELEVATION STORED IN 8D AND 9D RESP. OF VAC AREA
R0578      CDUY, CDUZ AND CDUX FROM A YMARK STORED AT 3, 5, AND 7 OF VAC AREA
R0579      CDUY, CDUZ AND CDUX FROM A XMARK STORED AT 2, 4, AND 6 OF VAC AREA
R0580    THE BASE ADDRESS OF THE CDUS IS STORED AT LOCATION S1
R0581
R0582    THE OUTPUT IS A STAR VECTOR REFERRED TO STABLE MEMBER AT LOC 32D
R0583    AND AVAILBLE IN MPAC
R0584
 0585                          15,3173   77630 1  AOTSM     ITA
 0586                          15,3174   00035 1                     29D
 0587                          15,3175   70001 1            SETPD    LXC,1           PUT BASE ADR OF VAC AREA IN X1
 0588                          15,3176   00015 0                     12D
 0589    REF    8 LAST 413     15,3177   00050 1                     S1
 0590                          15,3200   41545 0            DLOAD    PUSH            ZERO 12 - 13
 0591    REF    3 LAST 417     15,3201   33042 1                     ZERODP
 0592                          15,3202   45133 1            SLOAD*   RTB             LOAD AZIMUTH ANGLE (D)
 0593                          15,3203   00007 0                     6,1
 0594    REF    8 LAST 418     15,3204   33345 0                     CDULOGIC
 0595                          15,3205   71406 0            PUSH     COS
 0596                          15,3206   73525 1            PDDL     SIN             1/2 COSD 14-15
 0597                          15,3207   41476 1            DCOMP    PUSH            -1/2 SIND 16-17
 0598                          15,3210   45133 1            SLOAD*   RTB             LOAD ELEVATION ANGLE (E)
 0599                          15,3211   00010 0                     7,1
 0600    REF    9 LAST 420     15,3212   33345 0                     CDULOGIC
 0601                          15,3213   71406 0            PUSH     COS
 0602                          15,3214   06041 1            STODL    32D             1/2COSE
 0603                          15,3215   41556 1            SIN      PUSH            1/2 SINE 18-19
 0604                          15,3216   72405 0            DMP      SL1
 0605                          15,3217   00021 1                     16D
 0606                          15,3220   06043 0            STODL    34D             -1/2 SINE SIND UP 18-19
 0607                          15,3221   57405 1            DMP      DCOMP
 0608                          15,3222   00017 1                     14D
 0609                          15,3223   77752 1            SL1
 0610                          15,3224   36045 0            STCALL   36D             -1/2SINE COSD
 0611    REF    1              15,3225   32517 0                     NBSM            GET X PLANE IN SM
 0612                          15,3226   45515 1            PDVL     STADR           X PLANE IN SM IN 12-17
 0613                          15,3227   77736 0            STORE    32D             Y PLANE IN NB
 0614                          15,3230   62120 0            XCHX,1   INCR,1
 0615    REF    9 LAST 420     15,3231   00050 1                     S1              ADD ONE TO BASE ADR OF VAC AREA
 0616                          15,3232   00001 0                     1
 0617                          15,3233   47120 1            XCHX,1   CALL
 0618    REF   10 LAST 420     15,3234   00050 1                     S1              PUT NEW BASE ADR BACK IN S1
 0619    REF    2 LAST 420     15,3235   32517 0                     NBSM            GET Y PLANE IN SM
 0620                          15,3236   76435 1            VXV      VSL1
 0621                          15,3237   77676 0            VCOMP
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0622                           15,3240   00041 1          STORE  32D          STORE STAR VEC REFERRED TO SM
0623                           15,3241   77650 1          GOTO
0624                           15,3242   00035 1                 29D
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P0625                   GIVEN RR TRUNION AND SHAFT (T,S) IN TANG,+1, FIND THE ASSOCIATED LINE OF SIGNT IN NAV BASE AXES.
R0627   THE HALF UNIT VECTOR, .5( SIN(S)COS(T),-SIN(T),COS(S)COS(T) ) IS LEFT IN MPAC AND 32D.

 0629                           15,3243   45135 1  RRNB      SLOAD  RTB
 0630   REF  17 LAST 376        15,3244   00424 0                   TANG
 0631   REF  10 LAST 420        15,3245   33345 0                   CDULOGIC
 0632                           15,3246   41401 1            SETPD  PUSH               TRUNNION ANGLE TO 0.
 0633                           15,3247   00001 0                   0
 0634                           15,3250   57556 0            SIN    DCOMP
 0635                           15,3251   06043 0            STODL  34D                Y COMPONENT.

 0636                           15,3252   41546 0            COS    PUSH               .5 COS(T) TO 0.
 0637                           15,3253   45135 1            SLOAD  RTB
 0638   REF  18 LAST 422        15,3254   00425 1                   TANG +1
 0639   REF  11 LAST 422        15,3255   33345 0                   CDULOGIC
 0640                           15,3256   71406 0            PUSH   COS                SHAFT ANGLE TO 2.
 0641                           15,3257   72405 0            DMP    SL1
 0642                           15,3260   00001 0                   0
 0643                           15,3261   06045 0            STODL  36D                Z COMPONENT

 0644                           15,3262   41356 1            SIN    DMP
 0645                           15,3263   77752 1            SL1
 0646                           15,3264   22041 1            STOVL  32D
 0647                           15,3265   00041 1                   32D
 0648                           15,3266   77616 0            RVQ
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P0649          THE FOLLOWING ROUTINE TAKES A HALF UNIT TARGET VECTOR REFERRED TO NAV BASE COORDINATES AND FINDS BOTH
R0651    GIMBAL ORIENTATIONS AT WHICH THE RR MIGHT SIGHT THE TARGET. THE GIMBAL ANGLES CORRESPONDING TO THE PRESENT MODE
R0653    ARE LEFT IN MODEA AND THOSE WHICH WOULD BE USED AFTER A REMODE IN MODEB. THIS ROUTINE ASSUMES MODE 1 IS TRUNNION
R0655    ANGLE LESS THAN 90 DEGS IN ABS VALUE WITH ARBITRARY SHAFT, WITH A CORRESPONDING DEFINITION FOR MODE 2. MODE
R0657    SELECTION AND LIMIT CHECKING ARE DONE ELSEWHERE.

R0658          THE MODE 1 CONFIGURATION IS CALCULATED FROM THE VECTOR AND THEN MODE 2 IS FOUND USING THE RELATIONS

R0660          S(2) = 180 + S(1)
R0661          T(2) = 180 - T(1)

 0662                         15,3267  57545 1  RRANGLES DLOAD  DCOMP           SINCE WE WILL FIND THE MODE 1 SHAFT
 0663                         15,3270  00043 0                  34D             ANGLE LATER, WE CAN FIND THE MODE 1
 0664                         15,3271  67401 0           SETPD  ASIN            TRUNNION BY SIMPLY TAKING THE ARCSIN OF
 0665                         15,3272  00001 0                  0               THE Y COMPONENT, THE ASIN GIVING AN
 0666                         15,3273  44206 0           PUSH   BDSU            ANSWER WHOSE ABS VAL IS LESS THAN 90 DEG
 0667    REF   2 LAST 406     15,3274  33032 0                  HALFDP
 0668                         15,3275  06005 1           STODL  4               MODE 2 TRUNNION TO 4.

 0669    REF   4 LAST 420     15,3276  33042 1                  ZERODP
 0670                         15,3277  22043 0           STOVL  34D             UNIT THE PROJECTION OF THE VECTOR IN THE
 0671                         15,3300  00041 1                  32D             X-Z PLANE.
 0672                         15,3301  41056 1           UNIT   BOVB            CALL FOR S/C MANEUVER ON GIMBAL LOCK.
 0673    REF   4 LAST 240     15,3302  20346 1                  DESRETRN +1
 0674                         15,3303  06041 1           STODL  32D             PROJECTION VECTOR.
 0675                         15,3304  00041 1                  32D
 0676                         15,3305  46142 1           SR1    STQ
 0677    REF  10 LAST 413     15,3306  00051 0                  S2
 0678    REF  11 LAST 412     15,3307  06023 0           STODL  SINTH           USE ARCTRIG SINCE SHAFT COULD BE ARB.
 0679                         15,3310  00045 0                  36D
 0680                         15,3311  77742 0           SR1
 0681    REF   9 LAST 411     15,3312  36021 1           STCALL COSTH
 0682    REF   7 LAST 412     15,3313  32440 0                  ARCTRIG
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0683                      15,3314   43206 1          PUSH    DAD          MODE 1 SHAFT TO 2.
0684  REF   3 LAST 423    15,3315   33032 0                  HALFDP       (OVERFLOW DOESNT MATTER SINCE SCALED REV
0685                      15,3316   22007 0          STOVL   6
0686                      15,3317   00005 1                  4
0687                      15,3320   77624 1          RTB                  FIND MODE 2 CDU ANGLES.
0688  REF   1             15,3321   33431 1                  2V1STO2S
0689  REF   3 LAST 239    15,3322   22426 1          STOVL   MODEB
0690                      15,3323   00001 0                  0
0691                      15,3324   77624 1          RTB                  MODE 1 ANGLES TO MODE A.
0692  REF   2 LAST 424    15,3325   33431 1                  2V1STO2S
0693  REF   2 LAST 237    15,3326   00424 0          STORE   MODEA
0694                      15,3327   77776 1          EXIT

0695  REF  78 LAST 376    15,3330   4 0413 0         CS      RADMODES     SWAP MODEA AND MODEB IF RR IN MODE 2.
0696  REF  19 LAST 403    15,3331   7 7644 1         MASK    BIT12
0697  REF 303 LAST 401    15,3332   10 000 0         CCS     A
0698                      15,3333   1 3337 1         TCF     +4

0699  REF   3 LAST 424    15,3334   52 424 1         DXCH    MODEA
0700  REF   4 LAST 424    15,3335   52 426 0         DXCH    MODEB
0701  REF   4 LAST 424    15,3336   52 424 1         DXCH    MODEA

0702  REF  10 LAST 412    15,3337   0 6000 1         TC      INTPRET
0703                      15,3340   77650 1          GOTO
0704  REF  11 LAST 423    15,3341   00051 0                  S2

0705                                15,3342  ENDINFSS EQUALS
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L       RTB OP CODES                                                                          USER'S OWN PAGE NO.   1

 0001   REF   1                      15,3342               SETLOC ENDINFSS

R0002            LOAD TIME2, TIME1 INTO MPAC:

 0003                           15,3342  0 0006 1  LOADTIME EXTEND
 0004   REF  12 LAST 374        15,3343  3 0025 0           DCA     TIME2
 0005   REF   2 LAST  50        15,3344  1 6470 0           TCF     SLOAD2

R0006            CONVERT THE SINGLE PRECISION 2'S COMPLEMENT NUMBER ARRIVING IN MPAC (SCALED IN HALF-REVOLUTIONS) TO A
R0008   DP 1'S COMPLEMENT NUMBER SCALED IN REVOLUTIONS.

 0009   REF 533 LAST 396        15,3345 10 140 0  CDULOGIC CCS     MPAC
 0010   REF 142 LAST 403        15,3346  3 7665 0           CAF     ZERO
 0011                           15,3347  1 3352 1           TCF     +3
 0012                           15,3350  1 3351 1           NOOP
 0013   REF  17 LAST 232        15,3351  4 7642 1           CS      HALF

 0014   REF 534 LAST 425        15,3352 54 141 1            TS      MPAC +1
 0015   REF 143 LAST 425        15,3353  3 7665 0           CAF     ZERO
 0016   REF 535 LAST 425        15,3354 56 140 1            XCH     MPAC
 0017                           15,3355  0 0006 1           EXTEND
 0018   REF  18 LAST 425        15,3356  7 7642 1           MP      HALF
 0019   REF 536 LAST 425        15,3357 20 141 1            DAS     MPAC
 0020   REF   3 LAST 425        15,3360  1 6472 1           TCF     SLOAD2 +2       C(A) = +0.

R0021            READ IMU CDUS INTO MPAC AS A VECTOR. ESPECIALLY USEFUL IN CONNECTION WITH SMNB, ETC.

 0023                           15,3361  0 0004 0  READCDUS INHINT
 0024   REF   4 LAST 222        15,3362  3 0033 1           CA      CDUY            IN ORDER Y Z X
 0025   REF 537 LAST 425        15,3363 54 140 0            TS      MPAC
 0026   REF   9 LAST 376        15,3364  3 0034 0           CA      CDUZ
 0027   REF 538 LAST 425        15,3365 54 143 0            TS      MPAC +3
 0028   REF  11 LAST 376        15,3366  3 0032 0           CA      CDUX
 0029   REF   1                 15,3367  1 3376 1           TCF     READPIPS +6     COMMON CODING.

R0030            READ THE PIPS INTO MPAC WITHOUT CHANGING THEM:

 0031                           15,3370  0 0004 0  READPIPS INHINT
 0032   REF   4 LAST 376        15,3371  3 0037 0           CA      PIPAX
 0033   REF 539 LAST 425        15,3372 54 140 0            TS      MPAC
 0034   REF   2 LAST 197        15,3373  3 0040 0           CA      PIPAY
 0035   REF 540 LAST 425        15,3374 54 143 0            TS      MPAC +3
 0036   REF   3 LAST 376        15,3375  3 0041 1           CA      PIPAZ
 0037                           15,3376  0 0003 1           RELINT
 0038   REF 541 LAST 425        15,3377 54 145 0            TS      MPAC +5

 0039   REF 144 LAST 425        15,3400  3 7665 0           CAF     ZERO
 0040   REF 542 LAST 425        15,3401 54 141 1            TS      MPAC +1
 0041   REF 543 LAST 425        15,3402 54 144 1            TS      MPAC +4
 0042   REF 544 LAST 425        15,3403 54 146 0            TS      MPAC +6
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4596

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L        RTB OP CODES                                                                          USER'S OWN PAGE NO.   2

 0043    REF 101 LAST 362      15,3404  4 7657 0  VECMODE  CS       ONE
 0044    REF   9 LAST 106      15,3405  1 6013 1           TCF      NEWMODE

R0045              FORCE TP SIGN AGREEMENT IN MPAC:

 0046    REF   5 LAST 318      15,3406  0 7235 1  SGNAGREE TC       TPAGREE
 0047    REF  51 LAST 415      15,3407  1 6014 0           TCF      DANZIG

R0048              CONVERT THE DP 1'S COMPLEMENT ANGLE SCALED IN REVOLUTIONS TO A SINGLE PRECISION 2'S COMPLEMENT ANGLE
R0050    SCALED IN HALF-REVOLUTIONS.

 0051    REF   1               15,3410  0 3440 1  1STO2S   TC       1TO2SUB
 0052    REF 145 LAST 425      15,3411  3 7665 0           CAF      ZERO
 0053    REF 545 LAST 425      15,3412  54 141 1           TS       MPAC +1
 0054    REF  10 LAST 426      15,3413  1 6013 1           TCF      NEWMODE

R0055              DO 1STO2S ON A VECTOR OF ANGLES:

 0056    REF   2 LAST 426      15,3414  0 3440 1  V1STO2S  TC       1TO2SUB         ANSWER ARRIVES IN A AND MPAC.

 0057    REF 546 LAST 426      15,3415  52 146 0           DXCH     MPAC +5
 0058    REF 547 LAST 426      15,3416  52 141 1           DXCH     MPAC
 0059    REF   3 LAST 426      15,3417  0 3440 1           TC       1TO2SUB
 0060    REF 548 LAST 426      15,3420  54 142 1           TS       MPAC +2

 0061    REF 549 LAST 426      15,3421  52 144 1           DXCH     MPAC +3
 0062    REF 550 LAST 426      15,3422  52 141 1           DXCH     MPAC
 0063    REF   4 LAST 426      15,3423  0 3440 1           TC       1TO2SUB
 0064    REF 551 LAST 426      15,3424  54 141 1           TS       MPAC +1

 0065    REF 552 LAST 426      15,3425  3 0145 1           CA       MPAC +5
 0066    REF 553 LAST 426      15,3426  54 140 0           TS       MPAC

 0067    REF 102 LAST 426      15,3427  3 7657 1           CAF      ONE             MODE IS TP.
 0068    REF  11 LAST 426      15,3430  1 6013 1           TCF      NEWMODE

R0069              V1STO2S FOR 2 COMPONENT VECTOR. USED BY RR.

 0070    REF   5 LAST 426      15,3431  0 3440 1  2V1STO2S TC       1TO2SUB
 0071    REF 554 LAST 426      15,3432  52 144 1           DXCH     MPAC +3
 0072    REF 555 LAST 426      15,3433  52 141 1           DXCH     MPAC
 0073    REF   6 LAST 426      15,3434  0 3440 1           TC       1TO2SUB
 0074    REF 164 LAST 400      15,3435  54 001 1           TS       L
 0075    REF 556 LAST 426      15,3436  3 0143 1           CA       MPAC +3
 0076    REF   4 LAST 425      15,3437  1 6470 0           TCF      SLOAD2

R0077              SUBROUTINE TO DO DOUBLING AND 1'S TO 2'S CONVERSION:

 0078    REF 557 LAST 426      15,3440  52 141 1  1TO2SUB  DXCH     MPAC            FINAL MPAC +1 UNSPECIFIED.
 0079                          15,3441  20 001 1           DDOUBL
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L       RTB OP CODES                                                                USER'S OWN PAGE NO.  3

 0080   REF 304 LAST 424     15,3442  10 000 0        CCS    A
 0081   REF 103 LAST 426     15,3443  6 7657 1        AD     ONE
 0082                        15,3444  1 3446 0        TCF    +2
 0083                        15,3445  4 0000 0        COM                     THIS WAS REVERSE OF MSU.

 0084   REF 558 LAST 426     15,3446  54 140 0        TS     MPAC             AND SKIP ON OVERFLOW.
 0085   REF 266 LAST 395     15,3447  0 0002 0        TC     Q

 0086   REF 305 LAST 427     15,3450  50 000 1        INDEX  A                OVERFLOW UNCORRECT AND IN MSU.
 0087   REF   3 LAST 123     15,3451  3 7640 1        CAF    LIMITS
 0088   REF 559 LAST 427     15,3452  26 140 0        ADS    MPAC
 0089   REF 267 LAST 427     15,3453  0 0002 0        TC     Q
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P0090                SUBROUTINE TO INCREMENT CDUS
 0091   REF   1                15,3454   3 3467 1  INCRCDUS CAF     LOCTHETA
 0092   REF 119 LAST 312       15,3455  54 114 1            TS      BUF                 PLACE ADRES(THETA) IN BUF.
 0093   REF 560 LAST 427       15,3456  30 140 1            CAE     MPAC                INCREMENT IN 1S COMPL.
 0094   REF   2 LAST 262       15,3457   0 3470 1           TC      CDUINC

 0095   REF 120 LAST 428       15,3460  24 114 0            INCR    BUF
 0096   REF 561 LAST 428       15,3461  30 143 1            CAE     MPAC +3
 0097   REF   3 LAST 428       15,3462   0 3470 1           TC      CDUINC

 0098   REF 121 LAST 428       15,3463  24 114 0            INCR    BUF
 0099   REF 562 LAST 428       15,3464  30 145 1            CAE     MPAC +5
 0100   REF   4 LAST 428       15,3465   0 3470 1           TC      CDUINC

 0101   REF   1                15,3466   1 3404 0           TCF     VECMODE

 0102   REF   9 LAST 412       15,3467    00400 0  LOCTHETA ADRES   THETAD

R0103                THE FOLLOWING ROUTINE INCREMENTS IN 2S COMPLEMENT THE REGISTER WHOSE ADDRESS IS IN BUF BY THE 1S COMPL.
R0105   QUANTITY FOUND IN TEM2. THIS MAY BE USED TO INCREMENT DESIRED IMU AND OPTICS CDU ANGLES OR ANY OTHER 2S COMPL.
R0107   (+0 UNEQUAL TO -0) QUANTITY. MAY BE CALLED BY BANKCALL/SWCALL.

 0108   REF   3 LAST  11       15,3470  54 126 0   CDUINC   TS      TEM2                1S COMPL.QUANT. ARRIVES IN ACC. STORE IT
 0109   REF 122 LAST 428       15,3471  50 114 0            INDEX   BUF
 0110                          15,3472  10 000 0            CCS     0                   CHANGE 2S COMPL. ANGLE(IN BUF)INTO 1S
 0111   REF 104 LAST 427       15,3473   6 7657 1           AD      ONE
 0112                          15,3474   1 3500 0           TCF     +4
 0113   REF 105 LAST 428       15,3475   6 7657 1           AD      ONE
 0114   REF 106 LAST 428       15,3476   6 7657 1           AD      ONE                 OVERFLOW HERE IF 2S COMPL. IS 180 DEG.
 0115                          15,3477   4 0000 0           COM

 0116   REF   4 LAST 428       15,3500   6 0126 1           AD      TEM2                ADD IN INCREMENT. WILL OVERFLOW IF RE-
C0117                                                                                   SULT MOVES FROM 2ND TO 3D QUAD.(OR BACK)
 0118   REF 306 LAST 427       15,3501  10 000 0            CCS     A                   BACK TO 2S COMPL.
 0119   REF 107 LAST 428       15,3502   6 7657 1           AD      ONE
 0120                          15,3503   1 3505 0           TCF     +2
 0121                          15,3504   4 0000 0           COM
 0122   REF   5 LAST 428       15,3505  54 126 0            TS      TEM2                STORE 14BIT QUANTITY WITH PRESENT SIGN
 0123                          15,3506   1 3512 0           TCF     +4
 0124   REF 307 LAST 428       15,3507  50 000 1            INDEX   A                   OVERFLOW MEANS CORRECT 14BIT VALUE,WRONG
C0125                                                                                    SIGN.
 0126   REF   4 LAST 427       15,3510   3 7640 1           CAF     LIMITS              FIX IT,BY ADDING IN 37777 OR 40000
 0127   REF   6 LAST 428       15,3511   6 0126 1           AD      TEM2

 0128   REF 123 LAST 428       15,3512  50 114 0            INDEX   BUF
 0129                          15,3513  54 000 0            TS      0                   STORE NEW ANGLE IN 2S COMPLEMENT.
 0130   REF 268 LAST 427       15,3514   0 0002 0           TC      Q
```

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L       RTB OP CODES                                                                  USER'S OWN PAGE NO.  5

P0131              RTB TO TORQUE GYROS, EXCEPT FOR THE CALL TO IMUSTALL. ECADR OF COMMANDS ARRIVES IN X1.

 0133   REF  19 LAST 130      15,3515  50 104 1  PULSEIMU INDEX  FIXLOC         ADDRESS OF GYRO COMMANDS SHOULD BE IN X1
 0134   REF   9 LAST 117      15,3516  3 0046 0           CA     X1
 0135   REF  23 LAST 336      15,3517  0 4063 0           TC     BANKCALL
 0136   REF   3 LAST 263      15,3520   26317 0           CADR   IMUPULSE
 0137   REF  52 LAST 426      15,3521  1 6014 0           TCF    DANZIG
```

```
P0138               THE FOLLOWING ROUTINE IS USED ONLY IN BENCH TESTING THE RR.

 0139  REF  10 LAST 279   15,3522  0 4554 1  RRSIM     TC      FIXDELAY
 0140                     15,3523   00062 0            DEC     50

 0141  REF  23 LAST 377   15,3524  3 7656 0  RRSIM2    CAF     BIT2              SEE IF RR ECTR ENABLED.
 0142                     15,3525  0 0006 1            EXTEND
 0143                     15,3526  02 012 0            RAND    12
 0144                     15,3527  0 0006 1            EXTEND
 0145  REF   1            15,3530  1 3522 0            BZF     RRSIM

 0146  REF   7 LAST 428   15,3531  3 0126 1            CA      TEM2              SAVE EXEC TEMPS SINCE IN RUPT.
 0147  REF  24 LAST 276   15,3532  54 074 0            TS      RUPTREG1
 0148  REF   1            15,3533  3 3573 0            CAF     LOPTY
 0149  REF 124 LAST 428   15,3534  56 114 0            XCH     BUF
 0150  REF  25 LAST 276   15,3535  54 075 1            TS      RUPTREG2
 0151  REF   7 LAST 376   15,3536  3 0362 0            CA      LASTYCMD          ECTR.
 0152                     15,3537  6 0000 1            DOUBLE
 0153                     15,3540  0 0006 1            EXTEND
 0154  REF   1            15,3541  7 3574 0            MP      RRSIMG
 0155  REF   5 LAST 428   15,3542  0 3470 1            TC      CDUINC
 0156  REF 125 LAST 430   15,3543  24 114 0            INCR    BUF
 0157  REF  10 LAST 376   15,3544  3 0035 1            CA      OPTY              SHAFT CMD IS DIVIDED BY THE ABS VALUE OF
 0158                     15,3545  0 0006 1            EXTEND                    THE COS OF THE TRUNNION ANGLE.
 0159                     15,3546  20 007 1            MSU     7                 TO 1S COMPLEMENT.
 0160  REF   3 LAST 182   15,3547  0 4232 0            TC      SPCOS                                        *
 0161                     15,3550  0 0006 1            EXTEND                    SPCOS NOW GIVES COS SCALED AT 1 *
 0162  REF  34 LAST 377   15,3551  7 7642 1            MP      BIT14                 (A DAP GROUP FIX)          *
 0163  REF 308 LAST 428   15,3552  10 000 0            CCS     A
 0164                     15,3553  1 3556 0            TCF     +3
 0165                     15,3554  1 3556 0            TCF     +2
 0166                     15,3555  1 3556 0            TCF     +1
 0167  REF 108 LAST 428   15,3556  6 7657 1            AD      ONE
 0168  REF  50 LAST 371   15,3557  54 065 0            TS      ITEMP1

 0169  REF   5 LAST 232   15,3560  3 0363 1            CA      LASTXCMD          SHAFT RATE DEPENDS ON TRUNNION.
 0170                     15,3561  0 0006 1            EXTEND
 0171  REF   2 LAST 430   15,3562  7 3574 0            MP      RRSIMG
 0172                     15,3563  0 0006 1            EXTEND
 0173  REF  51 LAST 430   15,3564  10 065 0            DV      ITEMP1
 0174  REF   6 LAST 430   15,3565  0 3470 1            TC      CDUINC
 0175  REF  25 LAST 430   15,3566  3 0074 1            CA      RUPTREG1
 0176  REF   8 LAST 430   15,3567  54 126 0            TS      TEM2
 0177  REF  26 LAST 430   15,3570  3 0075 0            CA      RUPTREG2
 0178  REF 126 LAST 430   15,3571  54 114 1            TS      BUF
 0179  REF   2 LAST 430   15,3572  1 3522 0            TCF     RRSIM

 0180  REF  11 LAST 430   15,3573   00035 1  LOPTY     ADRES   OPTY
 0181                     15,3574   22755 0  RRSIMG    DEC     .59259
 0182                              15,3575   ENDRTBSS  EQUALS
```

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L        LEM FLIGHT CONTROL SYSTEM TEST                                                           USER'S OWN PAGE NO.   1
 0001                                        06,2000              BANK    6
 0002    REF    1                                 E4              EBANK=  JETSTEP


R0003    LEM FCS TEST  ENTRY AND INITIALIZATION JOB.

R0004           THIS JOB INITIALIZES THE ERASABLE TABLES FOR THE FCS TEST AND PUTS THE FOLLOWING PROGRAMS UNDER
R0006    WAITLIST CONTROL.
R0007                   (1) RCS JET SET TASK
R0008                   (2) ENGINE ON - OFF TASK
R0009                   (3) DESCENT ENGINE GIMBAL TRIM TASK
R0010                   (4) DESCENT ENGINE THROTTLE TASK
R0011                   (5) INTERFACE CHANNEL LOOK TASK


 0012    REF   11 LAST 367     06,2000  0 5317 1  FCSSTART TC      GRABWAIT          SO NOTHING DISRUPTS THE LOAD.
 0013    REF    1              06,2001  3 2054 1           CAF     JSTEPADR          THE START OF THE LIST.
 0014    REF  309 LAST 430     06,2002  10 000 0  FCS3     CCS     A
 0015    REF  563 LAST 428     06,2003  54 142 1           TS      MPAC +2
 0016    REF    1              06,2004  3 2057 1  FCS2     CAF     V04N01K           DISPLAY PRESENT CONTENTS IN R2.
 0017    REF   23 LAST 367     06,2005  0 5332 0           TC      NVSBWAIT
 0018    REF  564 LAST 431     06,2006  24 142 0           INCR    MPAC +2
 0019    REF    1              06,2007  3 2055 0           CAF     V21N02K
 0020    REF   24 LAST 431     06,2010  0 5332 0           TC      NVSBWAIT          IN CASE IT,S BUSY BUT IT SHOULDN,T BE.
 0021    REF   19 LAST 397     06,2011  0 5140 1           TC      ENDIDLE           WHILE LOADING.
 0022                          06,2012  0 2015 1           TC      +3                V34E, TERMINATE LOAD OF THIS LIST
A0023                                                                                SECTION, GO TO NEW SECTION OR TO TEST.
 0024                          06,2013  0 2014 0           TC      +1                V33E. PRESENT CONTENTS OK, PROCEED TO
A0025                                                                                NEXT LOCATION IN LIST.
 0026    REF    1              06,2014  0 2004 1           TC      FCS2
 0027    REF    1              06,2015  3 2056 0           CAF     V21N30K
 0028    REF   25 LAST 431     06,2016  0 5332 0           TC      NVSBWAIT
 0029    REF   20 LAST 431     06,2017  0 5140 1           TC      ENDIDLE
 0030    REF    8 LAST 367     06,2020  0 4437 0           TC      EJFREE
 0031    REF    1              06,2021  0 2024 0           TC      FCSTEST1          PROCEED TO TEST.
 0032    REF   23 LAST 354     06,2022  30 333 1           CAE     DSPTEM1           NEW ADDRESS.
 0033    REF    1              06,2023  0 2002 1           TC      FCS3
 0034    REF    1              06,2024  3 2060 0  FCSTEST1 CAF     V47K
 0035    REF   26 LAST 431     06,2025  0 5332 0           TC      NVSBWAIT          OUR VERB IN THE LIGHTS.
 0036                          06,2026  0 0004 0  FCSTEST  INHINT
 0037    REF    2 LAST 431                    E4           EBANK=  JETSTEP
 0038    REF   51 LAST 401     06,2027  3 7656 0           CAF     TWO               20MS.
 0039    REF   42 LAST 402     06,2030  0 4536 0           TC      WAITLIST
 0040    REF    3 LAST 431                    E4           EBANK=  JETSTEP
 0041                          06,2031   02065 0           2CADR   JETSTART
C0041    REF    1              06,2032   14004 0
 0042    REF   34 LAST 377     06,2033  3 7657 1           CAF     BIT1              10MS.
 0043    REF   43 LAST 431     06,2034  0 4536 0           TC      WAITLIST
 0044    REF    4 LAST 431                    E4           EBANK=  JETSTEP
 0045                      06,2035    02220 0             2CADR   ENGSTART
C0045   REF    1           06,2036    14004 0
 0046   REF   15 LAST 403  06,2037  3 6165 0              CAF     THREE           30MS.
 0047   REF    5 LAST 431                    E4           EBANK=  JETSTEP
 0048   REF   44 LAST 431  06,2040  0 4536 0              TC      WAITLIST
 0049                      06,2041    02315 1             2CADR   TRIMTOP
C0049   REF    1           06,2042    14004 0
 0050   REF   12 LAST 377  06,2043  3 7655 0              CAF     FOUR            40MS.
 0051   REF   45 LAST 432  06,2044  0 4536 0              TC      WAITLIST
 0052   REF    6 LAST 432                    E4           EBANK=  JETSTEP
 0053                      06,2045    02435 1             2CADR   THRSTART
C0053   REF    1           06,2046    14004 0
 0054   REF    8 LAST 377  06,2047  3 7664 1              CAF     FIVE            50MS.
 0055   REF   46 LAST 432  06,2050  0 4536 0              TC      WAITLIST
 0056   REF    7 LAST 432                    E4           EBANK=  JETSTEP
 0057                      06,2051    02523 1             2CADR   LOOKTOP
C0057   REF    1           06,2052    14004 0
 0058   REF    9 LAST 431  06,2053  0 4437 0              TC      EJFREE          NOW THEY START.

 0059   REF    8 LAST 432  06,2054    02007 1  JSTEPADR   ECADR   JETSTEP
 0060                      06,2055    02102 0  V21N02K    OCT     02102
 0061                      06,2056    02130 1  V21N30K    OCT     02130
 0062                      06,2057    00401 1  V04N01K    OCT     00401
 0063                      06,2060    04700 1  V47K       OCT     04700
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L       LEM FLIGHT CONTROL SYSTEM TEST                                                  USER'S OWN PAGE NO.   3

P0064   LEM FCS TEST   RCS JETSET TASK
R0065       THIS JOB ISSUES A PROFILE OF JET ON-OFF SIGNALS AS DETERMINED BY THE CONSTANTS IN A SET OF SIX REGISTERS.
R0067   THE SIX REGISTERS ARE, (1) NTIMES, THE NUMBER OF TIMES A PARTICULAR STEP WILL BE PERFORMED. (2) NEXTTIME, THE
R0069   TIME 3ETWEEN STEPS, A MAXIMUM OF 2 MINUTES, (3) JETONTM, THE TIME TO TURN THE JETS ON, SCALED FOR T3, (4) JET-
R0071   OFFTM, THE TIME AFTER ONTM TO TURN THE JETS OFF, (5) XJETS, THE PARTICULAR X JETS TO BE TURNED ON AND OFF
R0073   DURING EACH REPEAT OF A STEP, AND (6) YZJETS,, THE Y AND Z JETS TO BE TURNED ON AND OFF DURING EACH REPEAT OF A
R0075   STEP.  XJETS AND YZJETS MUST 3E IN THE SAME FORMAT AS CHANNELS 5 AND6 RESPECTIVELY.  THERE ARE EIGHT SETS OF
R0077   THESE SIX REGISTERS.
R0078       THE REGISTER JETSTEP IS USED TO INDEX THE 8 SETS OF REGISTERS, THE ALLOWABLE VALUES OF JETSTEP ARE +0 THRU 7
R0080       THIS JOB WILL BE ENTERED 3UT IMMEDIATELY ENDED IF THE INITIAL VALUES OF JETSTEP AND NTIMES ARE +0.


 0082   REF    9 LAST 432     06,2061  11'407 1  NEXTSET  CCS      JETSTEP         IT MAY BE ZERO.
 0083                         06,2062  0 2064 1           TC       +2              NOPE
 0084   REF   35 LAST 403     06,2063  0 4602 1           TC       TASKOVER        IT IS SO WE ARE DONE WITH THIS TASK.
 0085   REF   10 LAST 433     06,2064  55'407 1           TS       JETSTEP

 0086   REF   11 LAST 433     06,2065  51'407 0  JETSTART NDX      JETSTEP         ENTER HERE.
 0087   REF    1              06,2066  11'410 1           CCS      NTIMES          SEE IF THIS STEP IS FINISHED.
 0088                         06,2067  0 2071 0           TC       +2              NO
 0089   REF    1              06,2070  0 2061 1           TC       NEXTSET         YES
 0090   REF   12 LAST 433     06,2071  51'407 0           NDX      JETSTEP
 0091   REF    1              06,2072  31'420 0           CAE      NEXTTIME        MUST BE SCALED FOR T3.  REMEMBER TO BIAS
A0092                                                                              THIS FOR ON TIME.
 0093   REF   47 LAST 432     06,2073  0 4536 0           TC       WAITLIST
 0094   REF   13 LAST 433                    E4           EBANK=   JETSTEP
 0095                         06,2074   02110 0           2CADR    JTOP
C0095   REF    1              06,2075   14004 0
 0096   REF   36 LAST 433     06,2076  0 4602 1           TC       TASKOVER

 0097   REF  146 LAST 426     06,2077  3 7665 0  JETOFF   CAF      ZERO
 0098                         06,2100  0 0006 1           EXTEND
 0099                         06,2101  01 005 0           WRITE    5
 0100                         06,2102  0 0006 1           EXTEND
 0101                         06,2103  01 006 0           WRITE    6
 0102   REF   14 LAST 433     06,2104  51'407 0           NDX      JETSTEP
 0103   REF    2 LAST 433     06,2105  11'410 1           CCS      NTIMES
 0104   REF   15 LAST 433     06,2106  51'407 0           NDX      JETSTEP
 0105   REF    3 LAST 433     06,2107  55'410 1           TS       NTIMES          ONE LESS TIME.
 0106   REF   16 LAST 433     06,2110  51'407 0  JTOP     NDX      JETSTEP
 0107   REF    4 LAST 433     06,2111  11'410 1           CCS      NTIMES          FOR LOOPING.
 0108                         06,2112  0 2114 1           TC       +2
 0109   REF    2 LAST 433     06,2113  0 2061 1           TC       NEXTSET
 0110   REF   17 LAST 433     06,2114  51'407 0           NDX      JETSTEP
 0111   REF    1              06,2115  31'430 1           CAE      JETONTM         SCALED FOR T3.  TIME FOR JETS ON.
 0112   REF   48 LAST 433     06,2116  0 4536 0           TC       WAITLIST
 0113   REF   18 LAST 433                    E4           EBANK=   JETSTEP
 0114                         06,2117   02122 1           2CADR    JETON
C0114   REF    1              06,2120   14004 0
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 0115   REF  37 LAST 433   06,2121  0 4602 1             TC       TASKOVER

 0116   REF  19 LAST 433   06,2122  51'407 0  JETON      NDX      JETSTEP
 0117   REF   1            06,2123  31'440 0             CAE      XJETS          MUST BE IN CHANNEL 5 FORMAT.
 0118   REF   1            06,2124  55'401 1             TS       XJBUF
 0119   REF  20 LAST 434   06,2125  51'407 0             NDX      JETSTEP
 0120   REF   1            06,2126  31'450 1             CAE      YZJETS         MUST BE IN CHANNEL 6 FORMAT.
 0121   REF   1            06,2127  55'402 1             TS       YZJBUF
 0122                      06,2130  0 0006 1  JFAILCK    EXTEND                  THIS ROUTINE EXAMINES EACH JETFAIL BIT
 0123                      06,2131  00 032 0             READ     32             AND IF A FAILURE IS INDICATED THE CORRES
 0124                      06,2132  4 0000 0             COM                     PONDING COMMANDS ARE MASKED OUT .
 0125   REF   1            06,2133  55'403 0             TS       JFBUF          SAVE 32 REINVERTED.
 0126   REF   9 LAST 377   06,2134  3 7663 0             CAF      SEVEN
 0127   REF   1            06,2135  55'404 1  JF3        TS       FCNTR
 0128   REF   2 LAST 434   06,2136  31'403 1             CAE      JFBUF
 0129   REF   2 LAST 434   06,2137  51'404 0             NDX      FCNTR
 0130   REF  22 LAST 377   06,2140  7 7650 1             MASK     BIT8
 0131   REF 310 LAST 431   06,2141  10 000 0             CCS      A
 0132   REF   1            06,2142  0 2161 0             TC       JFAIL
 0133   REF   3 LAST 434   06,2143  11'404 1  JFAIL1     CCS      FCNTR
 0134   REF   1            06,2144  0 2135 1             TC       JF3
 0135   REF   2 LAST 434   06,2145  31'401 0             CAE      XJBUF
 0136                      06,2146  0 0006 1             EXTEND
 0137                      06,2147  01 005 0             WRITE    5              XJETS GO ON.
 0138   REF   2 LAST 434   06,2150  31'402 0             CAE      YZJBUF
 0139                      06,2151  0 0006 1             EXTEND
 0140                      06,2152  01 006 0             WRITE    6              YZJETS GO ON.
 0141   REF  21 LAST 434   06,2153  51'407 0             NDX      JETSTEP
 0142   REF   1            06,2154  31'460 1             CAE      JETOFFTM       JET OFF TIME SCALED FOR T3.
 0143   REF  49 LAST 433   06,2155  0 4536 0             TC       WAITLIST
 0144   REF  22 LAST 434                   E4            EBANK=   JETSTEP
 0145                      06,2156   02077 0             2CADR    JETOFF
C0145   REF   1            06,2157   14004 0
 0146   REF  38 LAST 434   06,2160  0 4602 1             TC       TASKOVER

 0147   REF   4 LAST 434   06,2161  51'404 0  JFAIL      NDX      FCNTR
 0148   REF   1            06,2162  4 2204 1             CS       XJETMASK
 0149   REF   3 LAST 434   06,2163  7 1401 1             MASK     XJBUF
 0150   REF   4 LAST 434   06,2164  55'401 1             TS       XJBUF
 0151   REF   5 LAST 434   06,2165  51'404 0             NDX      FCNTR
 0152   REF   1            06,2166  4 2174 0             CS       YZJETMSK
 0153   REF   3 LAST 434   06,2167  7 1402 1             MASK     YZJBUF
 0154   REF   4 LAST 434   06,2170  55'402 1             TS       YZJBUF
 0155   REF  27 LAST 412   06,2171  0 5413 1             TC       ALARM
 0156                      06,2172   01410 0             OCT      01410          TEMPORARY JET FAIL ALARM CODE.
 0157   REF   1            06,2173  0 2143 0             TC       JFAIL1
```

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L        LEM FLIGHT CONTROL SYSTEM TEST                                            USER'S OWN PAGE NO.   5

 0158                          06,2174   00010 0  YZJETMSK OCT     00010           JET 11
 0159                          06,2175   00020 0           OCT     00020           JET 12
 0160                          06,2176   00004 0           OCT     00004           JET 15
 0161                          06,2177   00200 0           OCT     00200           JET 16
 0162                          06,2200   00001 0           OCT     00001           JET 7
 0163                          06,2201   00002 0           OCT     00002           JET 3
 0164                          06,2202   00040 0           OCT     00040           JET 8
 0165                          06,2203   00100 0           OCT     00100           JET 4

 0166                          06,2204   00040 0  XJETMASK OCT     00040           JET 10
 0167                          06,2205   00020 0           OCT     00020           JET 9
 0168                          06,2206   00100 0           OCT     00100           JET 13
 0169                          06,2207   00200 0           OCT     00200           JET 14
 0170                          06,2210   00010 0           OCT     00010           JET 6
 0171                          06,2211   00001 0           OCT     00001           JET 1
 0172                          06,2212   00004 0           OCT     00004           JET 5
 0173                          06,2213   00002 0           OCT     00002           JET 2
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P0174   LEM FCS TEST  ENGINE ON - OFF TASK
R0175   THIS TASK TURNS THE LEM ASCENT OR DESCENT ENGINE ON AND OFF ACCORDING TOTHE CONSTANTS STORED IN THE FIVE SETS OF
R0177   REGISTERS, (1) CYLTIMES, WHICH CONTAINS THE NUMBER OF TIMES A PARTICULARSTEP WILL BE REPEATED, (2) NEXTCYLT,
R0179    WHICH CONTAINS THE TIME BETWEEN STEPS SCALED FOR T3, (3) ONTIME, WHICH CONTAINS THE TIME TO TURN THE ENGINE ON
R0181   WHICH ALSO DETERMINES THE LENGTH OF TIME THE ENGIME WILL BE OFF WITHIN A SERIES OF ON:OFF CYCLES, (4) OFFTIME,
R0183    WHICH CONTAINS THE NUMBER OF 2 MINUTES BEFORE THE ENGINE WILL BE TURNED OFF, AND (5) OFFTIMER, WHICH
R0185   CONTAINS THE RESIDUAL TIME BEFORE THE ENGINE WILL BE TURNED OFF.  OFFTIME AND OFFTIMER DETERMINE THE LENGTH
R0187   OF TIME THE ENGINE WILL BE ON IN ANY ONE CYCLE. THERE ARE THREE SETS OF THESE REGISTERS.
R0189        THE ENGSTEP REGISTER IS USED AS AN INDEX TO PICK UP A PARTICULAR SET  OF THE ABOVE 5 REGISTERS.  THIS TASK
R0191   WILL BE ENTERED BUT IMMEDIATELY ENDED IF ENGSTEP AND CYLTIMES = +0.     THE ALLOWABLE VALUES OF ENGSTEP ARE +0,
R0193   1 AND 2.

 0194   REF   1              06,2214  11'470 1  NXTONOFF CCS      ENGSTEP
 0195                        06,2215  0 2217 1           TC       +2
 0196   REF  39 LAST 434     06,2216  0 4602 1           TC       TASKOVER        EXIT HERE WHEN STEP AND CYL ARE +0.
 0197   REF   2 LAST 436     06,2217  55'470 1           TS       ENGSTEP         ONE LESS.

 0198   REF   3 LAST 436     06,2220  51'470 0  ENGSTART NDX      ENGSTEP         ENTER HERE.
 0199   REF   1              06,2221  11'471 0           CCS      CYLTIMES        NUM OF EACH  ON/OFF SET
 0200                        06,2222  0 2224 1           TC       +2
 0201   REF   1              06,2223  0 2214 1           TC       NXTONOFF        NO MORE OF THIS SET
 0202   REF   4 LAST 436     06,2224  51'470 0           NDX      ENGSTEP
 0203   REF   1              06,2225  31'474 1           CAE      NEXTCYLT        START OF NEXT CYCLE.
 0204   REF  50 LAST 434     06,2226  0 4536 0           TC       WAITLIST
 0205   REF   5 LAST 436                     E4          EBANK=   ENGSTEP
 0206                        06,2227   02250 1           2CADR    ENGONTM
C0206   REF   1              06,2230   14004 0
 0207   REF  40 LAST 436     06,2231  0 4602 1           TC       TASKOVER

 0208   REF   2 LAST 272     06,2232  4 4526 0  ENGRESET CS       PRIO30          BITS 13 AND 14.
 0209                        06,2233  0 0006 1           EXTEND
 0210                        06,2234  02 011 0           RAND     11
 0211   REF  35 LAST 430     06,2235  6 7642 0           AD       BIT14
 0212                        06,2236  0 0006 1           EXTEND
 0213                        06,2237  01 011 0           WRITE    11              ENG ON = 0, ENG OFF = 1.
 0214   REF   6 LAST 436     06,2240  51'470 0           NDX      ENGSTEP
 0215   REF   2 LAST 436     06,2241  11'471 0           CCS      CYLTIMES
 0216   REF 311 LAST 434     06,2242  10 000 0           CCS      A
 0217                        06,2243  0 2245 0           TC       +2
 0218   REF   2 LAST 436     06,2244  0 2214 1           TC       NXTONOFF        WAS ONE.
 0219   REF 109 LAST 430     06,2245  6 7657 1           AD       ONE             WAS MORE THAN ONE.
 0220   REF   7 LAST 436     06,2246  51'470 0           NDX      ENGSTEP
 0221   REF   3 LAST 436     06,2247  55'471 0           TS       CYLTIMES

 0222   REF   8 LAST 436     06,2250  51'470 0  ENGONTM  NDX      ENGSTEP
 0223   REF   1              06,2251  31'502 1           CAE      OFFTIME
 0224   REF   1              06,2252  55'406 0           TS       OFFTMBUF
 0225   REF   9 LAST 436     06,2253  51'470 0           NDX      ENGSTEP
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L         LEM FLIGHT CONTROL SYSTEM TEST                                               USER'S OWN PAGE NO.   7

 0226     REF    1                06,2254  31'477 1            CAE      ONTIME
 0227     REF   51 LAST 436       06,2255  0 4536 0            TC       WAITLIST
 0228     REF   10 LAST 436                      E4            EBANK=   ENGSTEP
 0229                             06,2256   02261 0            2CADR    ENGSET
C0229     REF    1                06,2257   14004 0
 0230     REF   41 LAST 436       06,2260  0 4602 1            TC       TASKOVER

 0231     REF    3 LAST 436       06,2261  4 4526 0  ENGSET    CS       PRIO30
 0232                             06,2262  0 0006 1            EXTEND
 0233                             06,2263  02 011 0            RAND     11
 0234     REF   22 LAST 377       06,2264  6 7643 1            AD       BIT13
 0235                             06,2265  0 0006 1            EXTEND
 0236                             06,2266  01 011 0            WRITE    11                 ENG ON = 1, ENG OFF = 0.
 0237     REF    2 LAST 436       06,2267  11'406 0  ENGRST    CCS      OFFTMBUF
 0238     REF    1                06,2270  0 2277 1            TC       LTIMEON            AT LEAST 2MIN. BEFORE ENGINE OFF.
 0239     REF   11 LAST 437       06,2271  51'470 0            NDX      ENGSTEP
 0240     REF    1                06,2272  31'505 0            CAE      OFFTIMER           LESS THAN 2MIN. TO ENGINE OFF.
 0241     REF   52 LAST 437       06,2273  0 4536 0            TC       WAITLIST
 0242     REF   12 LAST 437                      E4            EBANK=   ENGSTEP
 0243                             06,2274   02232 0            2CADR    ENGRESET
C0243     REF    1                06,2275   14004 0
 0244     REF   42 LAST 437       06,2276  0 4602 1            TC       TASKOVER

 0245     REF    3 LAST 437       06,2277  11'406 0  LTIMEON   CCS      OFFTMBUF           IS THERE ANY MORE.
 0246                             06,2300  0 2302 1            TC       +2                 YES.
 0247     REF    1                06,2301  0 2267 0            TC       ENGRST             NO.
 0248     REF    4 LAST 437       06,2302  55'406 0            TS       OFFTMBUF           ONE LESS.
 0249     REF    1                06,2303  3 2310 1            CAF      2MIN
 0250     REF   53 LAST 437       06,2304  0 4536 0            TC       WAITLIST
 0251     REF   13 LAST 437                      E4            EBANK=   ENGSTEP
 0252                             06,2305   02277 1            2CADR    LTIMEON
C0252     REF    2 LAST 437       06,2306   14004 0
 0253     REF   43 LAST 437       06,2307  0 4602 1            TC       TASKOVER

 0254                             06,2310   27340 0  2MIN      DEC      12000
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P0255   LEM FCS TEST  TRIM TASK
R0256   THIS PROGRAM ISSUES A PROFILE OF PITCH AND ROLL TRIM COMMANDS TO THE LEM DESCENT ENGINE GIMBAL IN ACCORDANCEWITH
R0258   THE VALUE S IN THE TRIMSTEP REGISTER AND THE 12 SETS OF 5 REGISTERS CALLED NUMTIMES, STEPDLYT, TRIMONT, TRIMOFFT
R0260   AND TRIMIND.  TRIMSTEP IS USED TO PICK UP A PARTICULAR SET OF THE 5 REGISTERS AND HAS ALLOWABLE VALUES FROM +0
R0262   THROUGH +11 DECIMAL.  THE 5 REGISTERS IN EACH SET ARE DEFINED AS FOLLOWS
R0263       (1) NUMTIMES DETERMINES THE NUMBER OF TIMES THE COMMAND IN TRIMIND  WILL BE ISSUED.  VALUES FROM +0 TO
R0265   OCT 37777 ARE PERMITTED.
R0266       (2) STEPDLYT DETERMINES THE TIME BETWEEN THE START OF A STEP AND THE BEGINNING OF TRIMONT.  STEPDLYT MUST BE
R0268   FORMATTED FOR T3, ITS MAXIMUM VALUE IS 2 MINUTES.
R0269       (3) TRIMONT DETERMINES THE TIME BETWEEN THE END OF STEPDLYT OR TRIMOFFT AND THE TIME THE TRIM COMMANDS ARE
R0271   ISSUED.  IT MUST BE FORMATTED FOR T3.
R0272       (4) TRIMOFFT DETERMINES THE LENGTH OF TIME THE TRIM COMMAND WILL BE ON, FORMATTED FOR T3.
R0274       (5) TRIMIND DETERMINES THE PITCH AND ROLL COMMAND TO BE ISSUED.  THE FORMAT IS, BIT9=1=+ PITCH COMMAND,
R0276   BIT10=1=-PITCH, BIT11=1= +ROLL, BIT12=1= -ROLL.  A BIT=0 INDICATES NO COMMAND.  ANY COMBINATION OF COMMANDS IS
R0278   PERMITTED.
R0279      THIS TASK WILL BE ENTERED BUT IMMEDIATELY ENDED IF TRIMSTEP AND NUMTIMES = +0.


 0281   REF   1                06,2311  11'510 0  NEXTTRIM CCS     TRIMSTEP
 0282                          06,2312  0 2314 0           TC      +2
 0283   REF  44 LAST 437       06,2313  0 4602 1           TC      TASKOVER          EXIT HERE.
 0284   REF   2 LAST 438       06,2314  55'510 0           TS      TRIMSTEP          LESS ONE.

 0285   REF   3 LAST 438       06,2315  51'510 1  TRIMTOP  NDX     TRIMSTEP          ENTER HERE.
 0286   REF   1                06,2316  11'511 1           CCS     NUMTIMES
 0287                          06,2317  0 2321 0           TC      +2
 0288   REF   1                06,2320  0 2311 0           TC      NEXTTRIM
 0289   REF   4 LAST 438       06,2321  51'510 1           NDX     TRIMSTEP
 0290   REF   1                06,2322  31'525 1           CAE     STEPDLYT
 0291   REF  54 LAST 437       06,2323  0 4536 0           TC      WAITLIST
 0292   REF   5 LAST 438                       E4          EBANK=  TRIMSTEP
 0293                          06,2324   02342 0           2CADR   TRIMSET
C0293   REF   1                06,2325   14004 0
 0294   REF  45 LAST 438       06,2326  0 4602 1           TC      TASKOVER

 0295   REF   1                06,2327  4 2426 1  TRIMOFF  CS      TRIMMASK
 0296                          06,2330  0 0006 1           EXTEND
 0297                          06,2331  03 012 1           WAND    12                TRIM GOES OFF.
 0298   REF   6 LAST 438       06,2332  51'510 1  NUMSTEP  NDX     TRIMSTEP
 0299   REF   2 LAST 438       06,2333  11'511 1           CCS     NUMTIMES
 0300   REF 312 LAST 436       06,2334  10 000 0           CCS     A
 0301                          06,2335  0 2337 1           TC      +2
 0302   REF   2 LAST 438       06,2336  0 2311 0           TC      NEXTTRIM          WAS ONE.
 0303   REF 110 LAST 436       06,2337  6 7657 1           AD      ONE
 0304   REF   7 LAST 438       06,2340  51'510 1           NDX     TRIMSTEP
 0305   REF   3 LAST 438       06,2341  55'511 1           TS      NUMTIMES
 0306   REF   8 LAST 438       06,2342  51'510 1  TRIMSET  NDX     TRIMSTEP
 0307   REF   1                06,2343  31'541 0           CAE     TRIMONT
 0308   REF  55 LAST 438       06,2344  0 4536 0           TC      WAITLIST
 0309  REF  9 LAST 438                  E4            EBANK=  TRIMSTEP
 0310                    06,2345   02350 0            2CADR   TRIMON
C0310  REF  1            06,2346   14004 0
 0311  REF 46 LAST 438   06,2347  0 4602 1            TC      TASKOVER

 0312  REF  1            06,2350  3 2425 0  TRIMON    CAF     BITS9,10    CHECK PITCH AND ROLL TRIM FAIL BITS.
 0313                    06,2351  0 0006 1            EXTEND
 0314                    06,2352  06 032 0            RXOR    32
 0315  REF  2 LAST 439   06,2353  7 2425 1            MASK    BITS9,10
 0316                    06,2354  0 0006 1            EXTEND
 0317  REF  1            06,2355  1 2363 1            BZF     TRIMON1
 0318  REF  3 LAST 213   06,2356  3 4533 0            CAF     PRIO35      FAIL IS ON, FLASH FAIL CODE (01400) AND
 0319  REF 19 LAST 396   06,2357  0 4363 0            TC      NOVAC       IDLE UNTIL SOMEONE RESETS IT, TERMINATES
 0320                    06,2360   02376 1            2CADR   PERFORM     THE TASK, OR DECIDES TO PROCEED WITH IT.
C0320  REF  1            06,2361   14004 0
 0321  REF 47 LAST 439   06,2362  0 4602 1            TC      TASKOVER

 0322  REF 10 LAST 439   06,2363  51'510 1  TRIMON1   NDX     TRIMSTEP
 0323  REF  1            06,2364  31'571 0            CAE     TRIMIND
 0324  REF  2 LAST 438   06,2365  7 2426 1            MASK    TRIMMASK    SAFETY PLAY
 0325                    06,2366  0 0006 1            EXTEND
 0326                    06,2367  05 012 1            WOR     12          TRIM STARTS.
 0327  REF 11 LAST 439   06,2370  51'510 1            NDX     TRIMSTEP
 0328  REF  1            06,2371  31'555 0            CAE     TRIMOFFT
 0329  REF 56 LAST 438   06,2372  0 4536 0            TC      WAITLIST
 0330  REF 12 LAST 439                  E4            EBANK=  TRIMSTEP
 0331                    06,2373   02327 0            2CADR   TRIMOFF
C0331  REF  1            06,2374   14004 0
 0332  REF 48 LAST 439   06,2375  0 4602 1            TC      TASKOVER

 0333  REF 12 LAST 431   06,2376  0 5317 1  PERFORM   TC      GRABWAIT    KEY RELEASE MAY COME ON.
 0334  REF  1            06,2377  3 2425 0            CAF     TRIMCODE    01400
 0335  REF 24 LAST 431   06,2400  54 333 0            TS      DSPTEM1
 0336  REF  1            06,2401  3 2427 1            CAF     V01N25K
 0337  REF 27 LAST 431   06,2402  0 5332 0            TC      NVSBWAIT
 0338  REF  1            06,2403  3 2430 1            CAF     V50K        PLEASE PERFORM.
 0339  REF 28 LAST 439   06,2404  0 5332 0            TC      NVSBWAIT
 0340  REF  7 LAST 397   06,2405  0 5274 0            TC      FLASHON     ANY RESPONSE TURNS IT OFF.
 0341  REF 21 LAST 431   06,2406  0 5140 1            TC      ENDIDLE     WAIT FOR SOMEONE TO DO SOMETHING.
 0342  REF 10 LAST 432   06,2407  0 4437 0            TC      EJFREE      V34E. TERMINATE THE TASK.
 0343  REF  1            06,2410  0 2417 1            TC      TR1         V33E. PROCEED WITH THE FAIL ON.
 0344                    06,2411  0 0004 0            INHINT              ENTER. THE FAIL HAS BEEN RESET.
 0345  REF 24 LAST 430   06,2412  3 7656 0            CAF     BIT2        20MS.
 0346  REF 57 LAST 439   06,2413  0 4536 0            TC      WAITLIST
 0347                    06,2414   02350 0            2CADR   TRIMON      CHECK AGAIN TO BE SURE, THEN PROCEED..
C0347  REF  2 LAST 439   06,2415   14004 0
 0348  REF 11 LAST 439   06,2416  0 4437 0            TC      EJFREE

 0349                    06,2417  0 0004 0  TR1       INHINT              PROCEED WITH THE FAIL.
 0350  REF 25 LAST 439   06,2420  3 7656 0            CAF     BIT2        20MS.
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L         LEM FLIGHT CONTROL SYSTEM TEST                                                    USER'S OWN PAGE NO.  10

 0351    REF   58 LAST 439        06,2421   0 4536 0             TC       WAITLIST
 0352                             06,2422    02363 0             2CADR    TRIMON1           BYPASS THE RECHECK.
C0352    REF    2 LAST 439        06,2423    14004 0
 0353    REF   12 LAST 439        06,2424   0 4437 0             TC       EJFREE

 0354                             06,2425    01400 1   BITS9,10  OCT      01400
 0355    REF    3 LAST 439                   06,2425   TRIMCODE  EQUALS   BITS9,10
 0356                             06,2426    07400 1   TRIMMASK  OCT      07400
 0357                             06,2427    00125 1   V01N25K   OCT      00125
 0358                             06,2430    05000 1   V50K      OCT      05000
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P0359   LEM FCS TEST  THROTTLE TASK
R0360      THIS PROGRAM ISSUES A PROFILE OF THROTTLE COMMANDS TO THE LEM DESCENT ENGINE.  THE PROFILE IS DETERMINED BY
R0362   THE VALUES IN THE THRTSTEP REGISTER AND THE 6  SETS OF REGISTERS, 5 PER SET, CALLED  DOTIMES, DELAY, THR1TIME,
R0364   THCOMM1 AND THCOMM2.  THE THRTSTEP REGISTER VALUE IS USED TO INDEX THE  6  SETS OF 5 REGISTERS AND HAS ALLOWABLE
R0366   VALUES OF +0 THROUGH +5.  THE 5 REGISTERS PER SET ARE DEFINED AS FOLLOWS
R0367        (1) DOTIMES DETERMINES THE NUMBER OF TIMES THE THROTTLE WILL BE EXERCISED AS PER THE VALUES OF THR1TIME,
R0369   THCOMM1 AND THCOMM2 OF THE CURRENT STEP.  IT HAS ALLOWABLE VALUES OF +0 THROUGH 37777 OCT.
R0371        (2) DELAY DETERMINES THE TIME BETWEEN THE START OF A STEP AND THE BE GINNING OF THR1TIME. ITIS CALLED ONLY
R0373   ONCE PER STEP,I.E., REPEATS OF THE SAME THCOMM1 AND THCOMM2 START AT THR1TIME.  DELAY MUST BE FORMATTED FOR T3
R0375   AND HENCE HAS A MAXIMUM VALUE OF 2 MINUTES.
R0376        (3) THR1TIME DETERMINES THE TIME BETWEEN THE END OF DELAY OR THE END   OF THCOMM2 AND THE START OF
R0378   THCOMM1.  IT MUST BE FORMATTED FOR T3.
R0379        (4) THCOMM1 AND (5) THCOMM2 DETERMINE THE NUMBER OF THRUST INCREASE  OR DECREASE PULSES TOBE ISSUED AT A
R0381   3.2KPPS RATE.  THE RANGE OF POSSIBLE VALUES OF EITHER IS FROM POSMAX (OCT 37777) TO NEGMAX (OCT 40000) ALTHOUGH
R0383   THE ACTUAL THROTTLE RANGE IS FROM OCT 6116 TO OCT 71661 (+,- 3150 DEC).
R0384      THIS TASK WILL BE ENTERED BUT IMMEDIATELY ENDED IF THE INITIAL VALUES OF THRTSTEP AND DOTIMES ARE +0.


 0386   REF   1             06,2431  11'605 1  NEXTTHRT CCS     THRTSTEP
 0387                       06,2432  0 2434 0           TC      +2
 0388   REF  49 LAST 439    06,2433  0 4602 1           TC      TASKOVER          EXIT HERE.
 0389   REF   2 LAST 441    06,2434  55'605 1           TS      THRTSTEP

 0390   REF   3 LAST 441    06,2435  51'605 0  THRSTART NDX     THRTSTEP          ENTER HERE.
 0391   REF   1             06,2436  11'606 1           CCS     DOTIMES           NUMBER OF TIMES COMMANDS 1 AND 2 DONE.
 0392                       06,2437  0 2441 1           TC      +2
 0393   REF   1             06,2440  0 2431 0           TC      NEXTTHRT
 0394   REF   4 LAST 441    06,2441  51'605 0           NDX     THRTSTEP
 0395   REF   1             06,2442  31'614 0           CAE     DELAY             TIME BETWEEN STEPS.  BIAS FOR THR1TIME.
A0396                                                                             MUST BE SCALED FOR T3.
 0397   REF  59 LAST 440    06,2443  0 4536 0           TC      WAITLIST
 0398   REF   5 LAST 441                   E4           EBANK=  THRTSTEP
 0399                       06,2444   02467 0           2CADR   THROTON1
C0399   REF   1             06,2445   14004 0
 0400   REF  50 LAST 441    06,2446  0 4602 1           TC      TASKOVER

 0401   REF   6 LAST 441    06,2447  51'605 0  THR2COMM NDX     THRTSTEP
 0402   REF   1             06,2450  31'636 0           CAE     THCOMM2           SAME REMARKS AS FOR THCOMM1.
 0403   REF   1             06,2451  0 2505 0           TC      THROTON
 0404   REF  35 LAST 431    06,2452  6 7657 1           AD      BIT1              10MS IN CASE OF NO THCOMM2.
 0405   REF  60 LAST 441    06,2453  0 4536 0           TC      WAITLIST
 0406   REF   7 LAST 441                   E4           EBANK=  THRTSTEP
 0407                       06,2454   02457 0           2CADR   CKDOTIME
C0407   REF   1             06,2455   14004 0
 0408   REF  51 LAST 441    06,2456  0 4602 1           TC      TASKOVER

 0409   REF   8 LAST 441    06,2457  51'605 0  CKDOTIME NDX     THRTSTEP
 0410   REF   2 LAST 441    06,2460  11'606 1           CCS     DOTIMES
 0411   REF 313 LAST 438    06,2461  10 000 0           CCS     A
 0412                      06,2462  0 2464 0            TC       +2
 0413  REF   2 LAST 441    06,2463  0 2431 0            TC       NEXTTHRT        WAS ONE.
 0414  REF 111 LAST 438    06,2464  6 7657 1            AD       ONE
 0415  REF   9 LAST 441    06,2465  51'605 0            NDX      THRTSTEP
 0416  REF   3 LAST 441    06,2466  55'606 1            TS       DOTIMES
 0417  REF  10 LAST 442    06,2467  51'605 0 THROTON1   NDX      THRTSTEP
 0418  REF   1             06,2470  31'622 0            CAE      THR1TIME        TIME BETWEEN DOTIMES.  SCALED FOR T3.
 0419  REF  61 LAST 441    06,2471  0 4536 0            TC       WAITLIST
 0420  REF  11 LAST 442                    E4           EBANK=   THRTSTEP
 0421                      06,2472   02475 0            2CADR    THR1COMM
C0421  REF   1             06,2473   14004 0
 0422  REF  52 LAST 441    06,2474  0 4602 1            TC       TASKOVER

 0423  REF  12 LAST 442    06,2475  51'605 0 THR1COMM   NDX      THRTSTEP
 0424  REF   1             06,2476  31'630 0            CAE      THCOMM1         SHOULD BE NO LARGER THAN 3150DEC.
 0425  REF   2 LAST 441    06,2477  0 2505 0            TC       THROTON
 0426  REF   1             06,2500  6 2522 0            AD       250MS           SO ACE CAN SAMPLE.
 0427  REF  62 LAST 442    06,2501  0 4536 0            TC       WAITLIST
 0428  REF  13 LAST 442                    E4           EBANK=   THRTSTEP
 0429                      06,2502   02447 1            2CADR    THR2COMM
C0429  REF   1             06,2503   14004 0
 0430  REF  53 LAST 442    06,2504  0 4602 1            TC       TASKOVER

 0431  REF   1             06,2505  54 055 0 THROTON    TS       THRUST          THROTTLE OUTPUT COUNTER.
 0432  REF   1             06,2506  55'405 0            TS       THBUF           SAVE FOR BZMF.
 0433  REF  25 LAST 377    06,2507  3 7654 1            CAF      BIT4
 0434                      06,2510  0 0006 1            EXTEND
 0435                      06,2511  05 014 1            WOR      14              ENABLE THRUST DRIVE.  COMMAND STARTS NOW
 0436  REF   2 LAST 442    06,2512  31'405 1            CAE      THBUF
 0437                      06,2513  0 0006 1            EXTEND
 0438                      06,2514  6 2516 1            BZMF     +2
 0439                      06,2515  4 0000 0            COM
 0440                      06,2516  4 0000 0            COM
 0441                      06,2517  0 0006 1            EXTEND
 0442  REF  37 LAST 402    06,2520  7 7646 0            MP       BIT10           SCALES FOR T3.
 0443  REF 269 LAST 428    06,2521  0 0002 0            TC       Q

 0444                      06,2522   00031 0 250MS      OCT      00031
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L          LEM FLIGHT CONTROL SYSTEM TEST                                                      USER'S OWN PAGE NO.  13

P0445      LEM FCS TEST  INTERFACE LOOK TASK.

R0446          THIS PROGRAM KEEPS A RUNNING HISTORY OF THE STATE OF ALL THE BITS IN INPUT CHANNELS 30, 31, 32 AND 33.
R0448      IT DOES THIS BY DETECTING A CHANGE OF AN INPUT BIT FROM AN INITIAL ONE STATE TO A ZERO STATE OR FROM AN INITIAL
R0450      ZERO TO A ONE.  THE HISTORY IS MAINTAINED IN TWO BUFFER REGISTERS FOR EACH CHANNEL, ONE FOR STORING ONE TO ZERO
R0452      CHANGES (30BUF1, +1, +2, AND +3) AND ONE FOR ZERO TO ONE CHANGES (30BUFO, +1 +2 AND +3).  THE OPERATOR MUST
R0454      LOAD THE INITIAL STATES OF THE INPUT CHANNELS INTO THEIR RESPECTIVE BUFFER REGISTERS BEFORE THIS PROGRAM IS IN-
R0456      ITIATED.
R0457          TO ALLOW THIS PROGRAM TO RUN C(QUITLOOK) MUST BE SET GREATER THAN +0 BEFORE IT IS STARTED.  IF THE OPERATOR
R0459      DOES NOT DESIRE THIS PROGRAM TO RUN HE SHOULD SET C(QUITLOOK)=+0 BEFORE STARTING THE FCS TEST.  AFTER THIS TASK
R0461      IS RUNNING THE OPERATOR CAN STOP IT BY SETTING C(QUITLOOK) = +0.
R0462          NO DISPLAYS OF EITHER THE BUFFER REGISTERS OR CHANNELS ARE INCORPORATED INTO THIS PROGRAM.  THIS WAS DONE TO
R0464      ALLOW THE TEST OPERATOR MONITORING FLEXIBILITY.  FOR REAL TIME MONITORING IT IS SUGGESTED THAT THE BUFFER
R0466      REGISTERS BE DISPLAYED WITH THE MONITOR VERBS (11 THROUGH 15).  ON THE OTHER HAND, THE OPERATOR MAY ELECT TO
R0468      PERFORM NO REAL TIME MONITORING UNTIL THE TEST IS COMPLETED, WHEN THE BUFFER REGISTERS WOULD BE CALLED FOR
R0470      DISPLAY (VERB 01) AND RECORDED.
R0471          THIS PROGRAM IS PRIMARILY INTENDED FOR INTERFACE MONITORING DURING THE LEM VIBRATION TEST AT BETHPAGE, N.Y.,
R0473      ALTHOUGH IT MAY ALSO BE USEFUL DURING VEHICAL LEVEL EMI TESTS.

  0474     REF    1                06,2523  11'654 0  LOOKTOP   CCS      QUITLOOK           IS THIS TASK WANTED.
  0475                             06,2524  0 2526 1            TC       +2                 YES.
  0476     REF   54 LAST 442       06,2525  0 4602 1            TC       TASKOVER           NO.
  0477     REF   16 LAST 432       06,2526  3 6165 0            CAF      THREE              START SCAN OF CHANNELS.
  0478     REF    1                06,2527  55'655 1  LOOKLOOP  TS       CHCNTR             3, 2, 1, 0.
  0479     REF    2 LAST 443       06,2530  51'655 0            NDX      CHCNTR
  0480     REF    1                06,2531  31'644 0            CAE      30BUF1
  0481                             06,2532  0 0006 1            EXTEND
  0482     REF    3 LAST 443       06,2533  5 1655 0            NDX      CHCNTR
  0483                             06,2534  02 030 0            RAND     30                 DETECTS CHANGES FROM 1 TO 0.
  0484     REF    4 LAST 443       06,2535  51'655 0            NDX      CHCNTR
  0485     REF    2 LAST 443       06,2536  57'644 0            XCH      30BUF1             STORE NEW ZEROS.
  0486     REF    5 LAST 443       06,2537  51'655 0            NDX      CHCNTR
  0487     REF    1                06,2540  31'650 0            CAE      30BUFO
  0488                             06,2541  0 0006 1            EXTEND
  0489     REF    6 LAST 443       06,2542  5 1655 0            NDX      CHCNTR
  0490                             06,2543  04 030 0            ROR      30                 DETECTS CHANGES FROM 0 TO 1.
  0491     REF    7 LAST 443       06,2544  51'655 0            NDX      CHCNTR
  0492     REF    2 LAST 443       06,2545  57'650 0            XCH      30BUFO             STORE NEW ONES.
  0493     REF    8 LAST 443       06,2546  11'655 1            CCS      CHCNTR             IS THIS SCAN DONE.
  0494     REF    1                06,2547  0 2527 0            TC       LOOKLOOP           NO.
  0495     REF    7 LAST 401       06,2550  3 7661 1            CAF      TEN                YES.  100MS RECALL.
  0496     REF   63 LAST 442       06,2551  0 4536 0            TC       WAITLIST
  0497     REF    2 LAST 443                      E4            EBANK=   QUITLOOK
  0498                             06,2552   02523 1            2CADR    LOOKTOP
 C0498     REF    2 LAST 432       06,2553   14004 0
  0499     REF   55 LAST 443       06,2554  0 4602 1            TC       TASKOVER
  0500                                      06,2555   ENDLFCSS =
L     IMU PERFORMANCE TESTS 1                                                         USER'S OWN PAGE NO.    1
0001                             14,2000                  BANK     14
0002  REF    6 LAST 415               E5                  EBANK=   XSM


0003  REF 112 LAST 442   14,2000  3 7657 1  AOTNBIMU  CAF      ONE             AOT-NB-IMU FINE ALIGNMENT TEST
0004  REF   1            14,2001  55'512 1            TS       EROPTN          ... TEST CAPABILITY ...

0005  REF  24 LAST 429   14,2002  0 4063 0            TC       BANKCALL
0006  REF   2 LAST 260   14,2003   26000 0            CADR     IMUZERO         IMU ZERO ENCODER MODE
0007  REF  11 LAST 424   14,2004  0 6000 1            TC       INTPRET
0008                     14,2005   77634 0            CALL
0009  REF   1            14,2006   30530 1                     LATAZCHK        TO LOAD AZIMUTH (SM) AND LATITUDE
0010                     14,2007   77634 0            CALL
0011  REF   1            14,2010   30325 0                     MAKEXSMD        TO SET UP A STABLE MEMBER DESIRED MATRIX
0012                     14,2011   47014 1            SET      CALL
0013  REF   1            14,2012   00065 1                     COAROFIN        FOR COARSE OR FINE ALIGN MARKS
0014  REF   1            14,2013   30405 0                     ERTHRVSE        TO CALCULATE EARTH RATE VECTOR
0015                     14,2014   77776 1            EXIT

0016  REF   1            14,2015  3 3655 1  POSLOAD   CAF      V24N30E         R1  0000X ENTER    POSITION 1,2, OR 3
0017  REF  29 LAST 439   14,2016  0 5332 0            TC       NVSBWAIT        R2  00000 ENTER    00001 FOR LAB OPTION
0018  REF  22 LAST 439   14,2017  0 5140 1            TC       ENDIDLE
0019  REF   1            14,2020  1 2745 1            TCF      ENDTEST
0020                     14,2021  1 2015 0            TCF      -4
0021  REF  25 LAST 439   14,2022  56 333 1            XCH      DSPTEM1         DO NOT USE POSITION 3 WITH NAV BASE AT
0022  REF   1            14,2023  55'544 1            TS       POSITON            ZERO DEGREE TILT ANGLE. (GIMBAL LOCK)

0023  REF  26 LAST 444   14,2024  10 334 1            CCS      DSPTEM1 +1
0024  REF   1            14,2025  1 2760 0            TCF      LEMLAB          SPECIAL LAB TEST TO BYPASS MARKS

0025  REF   1            14,2026  0 2576 1            TC       POSNJUMP        SET UP STABLE MEMBER DESIRED COORDINATES

0026  REF   1            14,2027  0 2501 1            TC       OPTDATA         TARGETS 1,2 AZIMUTH AND ELEVATION

0027  REF   1            14,2030  0 2135 1            TC       FINDNAVB        COARSE ALIGN MARKS

0028  REF  25 LAST 444   14,2031  0 4063 0            TC       BANKCALL
0029  REF   6 LAST 263   14,2032   26716 0            CADR     IMUSTALL        INSURE IMUZERO COMPLETION
0030  REF   2 LAST 444   14,2033  1 2745 1            TCF      ENDTEST

0031  REF   1            14,2034  0 2247 1            TC       PUTPOSX         TO COARSE ALIGN STABLE MEMBER

0032  REF   1            14,2035  0 2737 0            TC       GMLCKCHK        CHECK FOR GIMBAL LOCK BEFORE FINE ALIGN
0033  REF   1            14,2036  0 2727 1            TC       OGCZERO         FOR EARTH RATE COMPENSATION

0034  REF  26 LAST 444   14,2037  0 4063 0            TC       BANKCALL
0035  REF   2 LAST 263   14,2040   26227 1            CADR     IMUFINE         FINE ALIGN MODE
0036  REF  27 LAST 444   14,2041  0 4063 0            TC       BANKCALL
0037  REF   7 LAST 444   14,2042   26716 0            CADR     IMUSTALL
0038  REF   3 LAST 444   14,2043  1 2745 1            TCF      ENDTEST
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 0039   REF   2 LAST 444   14,2044  0 2135 1            TC      FINDNAVB     FINE ALIGN MARKS

 0040   REF   9 LAST 397   14,2045  0 5401 1            TC      FREEDSP      FREE DISPLAY SYSTEM

 0041   REF   1            14,2046  0 2263 1            TC      SMDCALC      TO FINE ALIGN STABLE MEMBER

 0042   REF  28 LAST 444   14,2047  0 4063 0  ERFINAL   TC      BANKCALL     LAST EARTH RATE SHOT
 0043   REF   1            14,2050   30422 0            CADR    EARTHR
 0044   REF   2 LAST 444   14,2051  11'512 1            CCS     EROPTN       IF DESIRED TO COMPENSATE CONTINUALLY
 0045   REF   1            14,2052  1 2065 1            TCF     MONSTART        CHANGE BY V21 N02 E XXXXX E 00000 E
 0046   REF   1            14,2053  1 2047 1            TCF     ERFINAL
 0047   REF   4 LAST 444   14,2054  1 2745 1            TCF     ENDTEST
 0048   REF   3 LAST 445   14,2055  55'512 1            TS      EROPTN
 0049                      14,2056  0 0004 0            INHINT
 0050   REF   1            14,2057  3 4517 0            CAF     PRIO21       PRIORITY 1 HIGHER THAN SXTNBIMU
 0051   REF   6 LAST 356   14,2060  0 4374 0            TC      FINDVAC
 0052                      14,2061   03062 0            2CADR   RDR37511
C0052   REF   1            14,2062   30005 1
 0053                      14,2063  0 0003 1            RELINT
 0054   REF   2 LAST 445   14,2064  0 2047 0            TC      ERFINAL

 0055   REF   3 LAST 283   14,2065  0 5470 1  MONSTART  TC      FINETIME     TIME AT INITIAL MISALIGNMENT
 0056   REF 565 LAST 431   14,2066  52 141 1            DXCH    MPAC
 0057                      14,2067  0 0003 1            RELINT
 0058   REF 147 LAST 433   14,2070  3 7665 0            CAF     ZERO         ZERO PIPA COUNTERS
 0059   REF   5 LAST 425   14,2071  54 037 1            TS      PIPAX
 0060   REF   3 LAST 425   14,2072  54 040 1            TS      PIPAY
 0061   REF   4 LAST 425   14,2073  54 041 0            TS      PIPAZ
 0062   REF   1            14,2074  55'551 0            TS      STOREPL
 0063   REF   1            14,2075  55'537 0            TS      NDXCTR
 0064   REF   1            14,2076  0 2454 0            TC      STORRSLT     STORE T(INITIAL) AND PIPAI = 0

 0065                      14,2077  0 0004 0            INHINT
 0066   REF   1            14,2100  3 3666 1            CAF     60SEC        INSURE PIPAI VARIES IN ONE DIRECTION
 0067   REF  64 LAST 443   14,2101  0 4536 0            TC      WAITLIST
 0068                      14,2102   02106 1            2CADR   PIP1
C0068   REF   1            14,2103   30005 1
 0069   REF   1            14,2104  3 2134 0            CAF     PIP2ADR
 0070   REF   6 LAST 360   14,2105  0 4416 0            TC      JOBSLEEP

 0071   REF   2 LAST 445   14,2106  3 2134 0  PIP1      CAF     PIP2ADR
 0072   REF   6 LAST 362   14,2107  0 4422 1            TC      JOBWAKE
 0073   REF  56 LAST 443   14,2110  0 4602 1            TC      TASKOVER

 0074   REF   1            14,2111  31'542 0  PIP2      CAE     PIPNDX
 0075   REF   1            14,2112  55'541 1            TS      PIPINDEX     POS1 PIPAY     POS2 PIPAX     POS3 PIPAX
 0076   REF  29 LAST 445   14,2113  0 4063 0            TC      BANKCALL
 0077   REF   1            14,2114   36771 0            CADR    CHECKG       SYNC ON PIPA PULSE

 0078                      14,2115  0 0003 1            RELINT
 0079  REF   2 LAST 445   14,2116  0 2454 0             TC      STORRSLT          STORE TIME AND PIPAI

 0080  REF   2 LAST 445   14,2117  31'543 1             CAE     PIPNDX +1
 0081  REF   2 LAST 445   14,2120  55'541 1             TS      PIPINDEX          POS1 PIPAZ     POS2 PIPAY     POS3 PIPAZ
 0082  REF  30 LAST 445   14,2121  0 4063 0             TC      BANKCALL
 0083  REF   2 LAST 445   14,2122   36771 0             CADR    CHECKG            SYNC ON PIPA PULSE

 0084                     14,2123  0 0003 1             RELINT
 0085  REF   3 LAST 446   14,2124  0 2454 0             TC      STORRSLT          STORE TIME AND PIPAI

 0086                     14,2125  0 0004 0             INHINT
 0087  REF   1            14,2126  3 3665 1             CAF     30SEC             MONITOR PIPAS AT 30 SECOND INTERVALS
 0088  REF  65 LAST 445   14,2127  0 4536 0             TC      WAITLIST
 0089                     14,2130   02106 1             2CADR   PIP1
C0089  REF   2 LAST 445   14,2131   30005 1
 0090  REF   3 LAST 445   14,2132  3 2134 0             CAF     PIP2ADR
 0091  REF   7 LAST 445   14,2133  0 4416 0             TC      JOBSLEEP
 0092  REF   1            14,2134   30111 0   PIP2ADR   CADR    PIP2
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L           IMU PERFORMANCE TESTS 1                                                                USER'S OWN PAGE NO.   4

 0093                            14,2135  0 0006 1  FINDNAVB EXTEND                   MARKS * CALC NB OR SM WRT EARTH REF
 0094   REF    4 LAST 267        14,2136  23'546 1           QXCH    QPLACE

 0100   REF   31 LAST 446        14,2137  0 4063 0           TC      BANKCALL
 0101   REF    1                 14,2140   27014 1           CADR    MKRELEAS         RELEASE MARK SYSTEM
 0102   REF  113 LAST 444        14,2141  3 7657 1           CAF     ONE
 0103   REF   27 LAST 444        14,2142  54 333 0           TS      DSPTEM1
 0104   REF    1                 14,2143  3 3651 0           CAF     V01N30E          DISPLAY 00001 IN R1
 0105   REF   30 LAST 444        14,2144  0 5332 0           TC      NVSBWAIT
 0106   REF  148 LAST 445        14,2145  3 7665 0           CAF     ZERO             TO INDICATE GROUND MARKS
 0107   REF   32 LAST 447        14,2146  0 4063 0           TC      BANKCALL
 0108   REF    1                 14,2147   26753 1           CADR    AOTMARK          MARK ON TARGET 1

 0109   REF   33 LAST 447        14,2150  0 4063 0           TC      BANKCALL
 0110   REF    1                 14,2151   26714 1           CADR    OPTSTALL         INSURE SUCCESSFUL MARK
 0111   REF    5 LAST 445        14,2152  1 2745 1           TCF     ENDTEST
 0112                            14,2153  0 0006 1           EXTEND
 0113   REF   40 LAST 376        14,2154  5 0374 1           INDEX   MARKSTAT
 0114                            14,2155  3 0001 0           DCA     0
 0115   REF    1                 14,2156  53'565 1           DXCH    TMARK            TIME(PRES) FOR EARTH RATE COMPENSATION

 0116   REF    1                 14,2157  0 2242 1           TC      GIMANGS1

 0117   REF   12 LAST 444        14,2160  0 6000 1           TC      INTPRET
 0118                            14,2161   47140 1           LXC,1   CALL
 0119   REF   41 LAST 447        14,2162   00374 1                   MARKSTAT         BASE ADDRESS VAC AREA FOR AOTNB
 0120   REF    1                 14,2163   33051 0                   AOTNB            OPTICS TO NAV BASE COORDINATE FRAME
 0121                            14,2164   47014 1           BON     CALL
 0122   REF    2 LAST 444        14,2165   00305 1                   COAROFIN         COARSE MARKS = 0    FINE MARKS = 1
 0123                            14,2166   30170 1                   +2
 0124   REF    3 LAST 420        14,2167   32517 0                   NBSM             NAV BASE DIRECT TO STABLE MEMBER
 0125   REF   27 LAST 416        14,2170   01445 0           STORE   STARAD           TARGET 1 WRT NAV BASE OR STABLE MEMBER
 0126   REF    1                 14,2171   01601 1           STORE   LOS1             ...FOR K...
 0127                            14,2172   77776 1           EXIT

 0128   REF   34 LAST 447        14,2173  0 4063 0           TC      BANKCALL
 0129   REF    2 LAST 447        14,2174   27014 1           CADR    MKRELEAS         RELEASE MARK SYSTEM
 0130   REF   52 LAST 431        14,2175  3 7656 0           CAF     TWO
 0131   REF   28 LAST 447        14,2176  54 333 0           TS      DSPTEM1
 0132   REF    2 LAST 447        14,2177  3 3651 0           CAF     V01N30E          DISPLAY 00002 IN R1
 0133   REF   31 LAST 447        14,2200  0 5332 0           TC      NVSBWAIT
 0134   REF  149 LAST 447        14,2201  3 7665 0           CAF     ZERO             TO INDICATE GROUND MARKS
 0135   REF   35 LAST 447        14,2202  0 4063 0           TC      BANKCALL
 0136   REF    2 LAST 447        14,2203   26753 1           CADR    AOTMARK          MARK ON TARGET 2

 0137   REF   38 LAST 442        14,2204  3 7646 1           CAF     BIT10
 0138   REF   22 LAST 376        14,2205  7 0061 1           MASK    STATE            BIT10 = COAROFIN
 0139   REF  314 LAST 441        14,2206  10 000 0           CCS     A
 0140   REF    1                 14,2207  1 2215 1           TCF     EARRTCOM +5      IF COARSE ALIGN MARKS
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0141  REF  36 LAST 447   14,2210  0 4063 0  EARRTCOM TC       BANKCALL        EARTH RATE COMPENSATION BETWEEN MARKS
0142  REF   2 LAST 445   14,2211    30422 0           CADR     EARTHR
0143  REF   2 LAST 158   14,2212  10 372 0            CCS      OPTCADR         +0 IF MARK BUTTON NOT DEPRESSED
0144                     14,2213  1 2216 1            TCF      +3
0145  REF   2 LAST 447   14,2214  1 2210 1            TCF      EARRTCOM        CONTINUE TO COMPENSATE FOR EARTH RATE
0146                     14,2215  1 2216 1            TCF      +1
0147  REF  37 LAST 448   14,2216  0 4063 0            TC       BANKCALL
0148  REF   2 LAST 447   14,2217    26714 1           CADR     OPTSTALL        INSURE SUCCESSFUL MARK
0149  REF   6 LAST 447   14,2220  1 2745 1            TCF      ENDTEST

0150  REF   2 LAST 447   14,2221  0 2242 1            TC       GIMANGS1

0151  REF  13 LAST 447   14,2222  0 6000 1            TC       INTPRET
0152                     14,2223    47140 1           LXC,1    CALL
0153  REF  42 LAST 447   14,2224    00374 1                    MARKSTAT        BASE ADDRESS VAC AREA FOR AOTNB
0154  REF   2 LAST 447   14,2225    33051 0                    AOTNB           OPTICS TO NAV BASE COORDINATE FRAME
0155                     14,2226    47014 1           BONCLR   CALL            SET TO ZERO FOR FINE ALIGN MARKS
0156  REF   3 LAST 447   14,2227    00205 0                    COAROFIN        COARSE MARKS = 0    FINE MARKS = 1
0157                     14,2230    30232 1                    +2
0158  REF   4 LAST 447   14,2231    32517 0                    NBSM            NAV BASE DIRECT TO STABLE MEMBER
0159  REF  28 LAST 447   14,2232    01453 1           STORE    STARAD +6       TARGET 2 WRT NAV BASE OR STABLE MEMBER
0160  REF   1            14,2233    01607 1           STORE    LOS2            ...FOR K...

0161                     14,2234    77634 0  MATXDET  CALL
0162  REF   1            14,2235    30350 1                    TAR/EREF        TARGETS 1,2 WRT EARTH REF FRAME
0163                     14,2236    77634 0           CALL
0164  REF   1            14,2237    32677 0                    AXISGEN         NAV BASE OR SM WRT EARTH REF FRAME
0165                     14,2240    77776 1           EXIT
0166  REF   5 LAST 447   14,2241  0 1546 1            TC       QPLACE


0167  REF  53 LAST 447   14,2242  3 7656 0  GIMANGS1 CAF      TWO             BASE ADDRESS GIMBAL ANGLES FOR NBSM
0168  REF  43 LAST 448   14,2243  6 0374 1            AD       MARKSTAT
0169  REF  20 LAST 429   14,2244  50 104 1            INDEX    FIXLOC
0170  REF  11 LAST 420   14,2245  54 050 0            TS       51
0171  REF 270 LAST 442   14,2246  0 0002 0            TC       Q
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0172                    14,2247  0 0006 1  PUTPOSX  EXTEND            COARSE ALIGNS STABLE MEMBER
0173   REF   6 LAST 448 14,2250  23'546 1           QXCH    QPLACE

0174   REF  14 LAST 448 14,2251  0 6000 1           TC      INTPRET
0175                    14,2252   77634 0           CALL
0176   REF   1          14,2253   32615 1                   CALCGA    CALCULATE COARSE ALIGN GIMBAL ANGLES
0177                    14,2254   77776 1           EXIT

0178   REF  38 LAST 448 14,2255  0 4063 0           TC      BANKCALL
0179   REF   2 LAST 261 14,2256   26055 0           CADR    IMUCOARS  COARSE ALIGN MODE
0180   REF  39 LAST 449 14,2257  0 4063 0           TC      BANKCALL
0181   REF   8 LAST 444 14,2260   26716 0           CADR    IMUSTALL
0182   REF   7 LAST 448 14,2261  1 2745 1           TCF     ENDTEST
0183   REF   7 LAST 449 14,2262  0 1546 1           TC      QPLACE



0184                    14,2263  0 0006 1  SMDCALC  EXTEND            FINE ALIGNS STABLE MEMBER
0185   REF   8 LAST 449 14,2264  23'546 1           QXCH    QPLACE

0186   REF  15 LAST 449 14,2265  0 6000 1           TC      INTPRET
0187                    14,2266   64375 1           VLOAD   MXV
0188   REF   7 LAST 444 14,2267   01401 0                   XSM       XSM DESIRED WRT EARTH REF FRAME
0189   REF  29 LAST 448 14,2270   01445 0                   STARAD    THEN TO SM PRESENT OR NAV BASE FRAME
0190                    14,2271   43172 1           VSL1    BOFF
0191   REF   4 LAST 448 14,2272   00345 0                   COAROFIN  BIT10 FOR LEMLAB TEST
0192                    14,2273   30276 1                   +3
0193                    14,2274   36041 1           STCALL  32D
0194   REF   5 LAST 448 14,2275   32517 0                   NBSM      THEN TO SM PRESENT FRAME
0195   REF  13 LAST 414 14,2276   23423 0           STOVL   XDC
0196   REF   5 LAST 415 14,2277   01407 0                   YSM       YSM DESIRED WRT EARTH REF FRAME

0197                    14,2300   76521 0           MXV     VSL1
0198   REF  30 LAST 449 14,2301   01445 0                   STARAD    THEN TO SM PRESENT OR NAV BASE FRAME
0199                    14,2302   77614 1           BOFF
0200   REF   5 LAST 449 14,2303   00345 0                   COAROFIN  BIT10 FOR LEMLAB TEST
0201                    14,2304   30307 0                   +3
0202                    14,2305   36041 1           STCALL  32D
0203   REF   6 LAST 449 14,2306   32517 0                   NBSM      THEN TO SM PRESENT FRAME
0204   REF   3 LAST 414 14,2307   23431 0           STOVL   YDC
0205   REF  14 LAST 449 14,2310   01423 0                   XDC

0206                    14,2311   76435 1           VXV     VSL1
0207   REF   4 LAST 449 14,2312   01431 0                   YDC
0208   REF   3 LAST 414 14,2313   37437 0           STCALL  ZDC       ZSM DESIRED WRT SM PRESENT FRAME
0209   REF   1          14,2314   32367 1                   CALCGTA   CALCULATE FINE ALIGN TORQUING ANGLES

0210                    14,2315   45170 0           AXT,1   RTB
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L       IMU PERFORMANCE TESTS 1                                                     USER'S OWN PAGE NO.   7

 0211   REF    5 LAST 412     14,2316    02500 0          ECADR   OGC               X1 = BASE ADDRESS OF TORQUING ANGLES
 0212   REF    1              14,2317    33515 0                  PULSEIMU          TO PUT OUT GYRO TORQUING PULSES
 0213                         14,2320    77776 1          EXIT

 0214   REF   40 LAST 449     14,2321  0 4063 0           TC      BANKCALL
 0215   REF    9 LAST 449     14,2322    26716 0          CADR    IMUSTALL          WAIT FOR PULSES TO GET OUT
 0216   REF    8 LAST 449     14,2323  1 2745 1           TCF     ENDTEST
 0217   REF    9 LAST 449     14,2324  0 1546 1           TC      QPLACE
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0218                          14,2325   77776 1  MAKEXSMD  EXIT                    XSM V     YSM SW     ZSM SE

0219    REF   1               14,2326  3 3660 1            CAF     17DEC           ZERO XSM, YSM, AND ZSM
0220    REF   1               14,2327  55'776 1            TS      ZERONDX
0221    REF   1               14,2330  3 3676 0            CAF     XSMADRX
0222    REF  41 LAST 450      14,2331  0 4063 0            TC      BANKCALL
0223    REF   1               14,2332   37236 1            CADR    ZEROING                   VERT        SOUTH        EAST

0224    REF  19 LAST 425      14,2333  3 7642 0            CAF     HALF            XSM     * +1          0            0       *
0225    REF   8 LAST 449      14,2334  55'400 0            TS      XSM                     *                                  *
0226    REF  16 LAST 449      14,2335  0 6000 1            TC      INTPRET                 *                                  *
0227                          14,2336   73545 1            DLOAD   SIN             YSM     *  0      +SIN(AZ)     +COS(AZ)  *
0228    REF   1               14,2337   01507 1                    AZIMUTH                 *                                  *
0229    REF   9 LAST 451      14,2340   01411 1            STORE   XSM +8D                 *                                  *
0230    REF  10 LAST 451      14,2341   07421 1            STODL   XSM +16D        ZSM     *  0      -COS(AZ)     +SIN(AZ)  *
0231    REF   2 LAST 451      14,2342   01507 1                    AZIMUTH
0232                          14,2343   77746 1            COS
0233    REF  11 LAST 451      14,2344   01413 0            STORE   XSM +10D
0234                          14,2345   77676 0            DCOMP
0235    REF  12 LAST 451      14,2346   01417 1            STORE   XSM +14D
0236                          14,2347   77616 0            RVQ


0237                          14,2350   77170 1  TAR/EREF  AXT,1   AXT,2                         TARGET VECTOR
0238                          14,2351   00002 0                    2               SIN(EL)   -COS(AZ)COS(EL)   SIN(AZ)COS(EL)
0239                          14,2352   00014 1                    12D
0240                          14,2353   77731 1            SSP
0241    REF  12 LAST 424      14,2354   00052 0                    S2
0242                          14,2355   00006 1                    6               TARGET 1                            TARGET 2

0243                          14,2356   60533 1  TAR1      SLOAD*  SR2             X1=2  X2=12  S2=6 . X1=0  X2=6  S2=6
0244    REF   1               14,2357   01557 1                    TAZEL1 +3,1
0245                          14,2360   00001 0            STORE   0               PD00           ELEVATION            PD00
0246                          14,2361   77756 0            SIN
0247                          14,2362   12023 0            STODL   18D,2           PD06  ***       SIN(EL)         ***  PD12

0248                          14,2363   00001 0                    0
0249                          14,2364   41546 0            COS     PUSH            PD00            COS(EL)             PD00
0250                          14,2365   45133 1            SLOAD*  RTB
0251    REF   2 LAST 451      14,2366   01556 0                    TAZEL1 +2,1
0252    REF  12 LAST 422      14,2367   33345 0                    CDULOGIC
0253                          14,2370   00003 1            STORE   2               PD02            AZIMUTH             PD02
0254                          14,2371   41356 1            SIN     DMP
0255                          14,2372   00001 0                    0
0256                          14,2373   77752 1            SL1
0257                          14,2374   12027 1            STODL   22D,2           PD10  ***   +SIN(AZ)COS(EL)     ***  PD16

0258                          14,2375   00003 1                    2
0259                          14,2376   41346 0            COS     DMP
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 0260                   14,2377   57552 1      SL1     DCOMP
 0261                   14,2400   04025 1      STORE   20D,2          PD08  ***   -COS(AZ)COS(EL)     ***  PD14

 0262                   14,2401   61170 0      AXT,1   TIX,2
 0263                   14,2402   00000 1              0
 0264   REF    1        14,2403   30356 1              TAR1
 0265                   14,2404   77616 0      RVQ
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0266                           14,2405    65345 0  ERTHRVSE DLOAD   PDDL
0267     REF    5 LAST 423     14,2406    33042 1                   ZERODP             PD24 = (SIN  -COS  0)(OMEG/MS)
0268     REF    1              14,2407    01511 0                   LATITUDE
0269                           14,2410    57546 1           COS     DCOMP
0270                           14,2411    73525 1           PDDL    SIN
0271     REF    2 LAST 453     14,2412    01511 0                   LATITUDE           EARTH RATE = .1504 ARCSEC / 10 MSEC
0272                           14,2413    74266 0           VDEF    VXSC               1.618 GYRO PULSES = 1 ARCSEC
0273     REF    1              14,2414    31702 0                   OMEG/MS            OMEG/MS = .243... GYRO PULSES / 10 MSEC
0274     REF    1              14,2415    01514 0           STORE   ERVECTOR

0275                           14,2416    77624 1           RTB
0276     REF    1              14,2417    33342 1                   LOADTIME
0277     REF    2 LAST 447     14,2420    01565 0           STORE   TMARK              TIME FOR GYRO DRIFT - PIPA SCALE FACTOR
0278                           14,2421    77616 0           RVQ



0279     REF    4 LAST 342     14,2422  0 4112 1  EARTHR    TC      MAKECADR           CALCULATES AND COMPENSATES EARTH RATE
0280     REF    1              14,2423    55'547 1          TS      QPLACES

0281     REF   17 LAST 451     14,2424  0 6000 1            TC      INTPRET
0282                           14,2425    77624 1           RTB
0283     REF    2 LAST 453     14,2426    33342 1                   LOADTIME           T(PRESENT)
0284     REF    1              14,2427    01562 1           STORE   TEMPTIME
0285                           14,2430    54225 0           DSU     SL
0286     REF    3 LAST 453     14,2431    01565 0                   TMARK              T(PRES) - T(PREV) = DT    SCALED 10 MSEC
0287                           14,2432    00212 0                   9D                 2 TO 21ST POWER = 1 REVOLUTION
0288                           14,2433    64361 1           VXSC    MXV
0289     REF    2 LAST 453     14,2434    01514 0                   ERVECTOR           VT = (SIN  -COS  0)(OMEG/MS)(DT)
0290     REF   13 LAST 451     14,2435    01401 0                   XSM                (XSM)(VT) = EARTH RATE COMPENSATION
0291                           14,2436    77655 1           VAD
0292     REF    2 LAST  23     14,2437    01772 1                   ERCOMP
0293     REF    3 LAST 453     14,2440    07772 1           STODL   ERCOMP
0294     REF    2 LAST 453     14,2441    01562 1                   TEMPTIME
0295     REF    4 LAST 453     14,2442    01565 0           STORE   TMARK              T(PREVIOUS)

0296                           14,2443    45170 0           AXT,1   RTB
0297     REF    4 LAST 453     14,2444    02771 1           ECADR   ERCOMP
0298     REF    2 LAST 450     14,2445    33515 0                   PULSEIMU           TO PUT OUT GYRO TORQUING PULSES
0299                           14,2446    77776 1           EXIT

0300     REF   42 LAST 451     14,2447  0 4063 0            TC      BANKCALL
0301     REF   10 LAST 450     14,2450    26716 0           CADR    IMUSTALL           WAIT FOR PULSES TO GET OUT
0302     REF    9 LAST 450     14,2451  1 2745 1            TCF     ENDTEST
0303     REF    2 LAST 453     14,2452    31'547 0          CAE     QPLACES
0304     REF   12 LAST 360     14,2453  1 4105 0            TCF     BANKJUMP
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0305                          14,2454  0 0006 1  STORRSLT EXTEND
0306   REF  10 LAST 450       14,2455  23'546 1           QXCH    QPLACE

0307   REF  18 LAST 453       14,2456  0 6000 1           TC      INTPRET              DP TIME IN MPAC SCALED .312(5) MSEC
0308                          14,2457   54340 1           LXC,1   SL
0309   REF   2 LAST 445       14,2460   01537 1                   NDXCTR
0310                          14,2461   00204 1                   3
0311                          14,2462   45005 0           DMP     RTB
0312   REF   1                14,2463   31700 1                   SCALFTR
0313   REF   2 LAST 283       14,2464   33406 0                   SGNAGREE
0314   REF  29 LAST  25       14,2465   03571 1           STORE   GENPL,1              STORE DP TIME
0315                          14,2466   77776 1           EXIT

0316   REF   2 LAST 445       14,2467  57'551 1           XCH     STOREPL              CONTAINS C(PIPAI)
0317   REF   3 LAST 454       14,2470  51'537 1           INDEX   NDXCTR
0318   REF  30 LAST 454       14,2471  55'572 1           TS      GENPL +2             STORE PIPA COUNTER READING
0319   REF   4 LAST 454       14,2472  4 1537 0           CS      NDXCTR
0320   REF   1                14,2473  6 3664 0           AD      72DEC
0321                          14,2474  0 0006 1           EXTEND
0322   REF   1                14,2475  6 3123 1           BZMF    MISALIGN             TO CALCULATE MISALIGNMENT
0323   REF  17 LAST 443       14,2476  3 6165 0           CAF     THREE
0324   REF   5 LAST 454       14,2477  27'537 0           ADS     NDXCTR
0325   REF  11 LAST 454       14,2500  0 1546 1           TC      QPLACE

0326                          14,2501  0 0006 1  OPTDATA  EXTEND                       CALLS FOR AZIMUTH AND ELEVATION OF
0327   REF  12 LAST 454       14,2502  23'546 1           QXCH    QPLACE                  TARGET 1, THEN TARGET 2

0328   REF  36 LAST 441       14,2503  3 7657 1           CAF     BIT1                 AZIMUTH CLOCKWISE FROM NORTH TO TARGET
0329                          14,2504  22 007 0           ZL                           ELEVATION MEASURED FROM HORIZONTAL
0330   REF   1                14,2505  23'550 0           LXCH    RUN
0331   REF  29 LAST 447       14,2506  54 335 0           TS      DSPTEM1 +2
0332   REF   1                14,2507  3 3652 0           CAF     V05N30E              DISPLAY TARGET NUMBER IN R3
0333   REF  32 LAST 447       14,2510  0 5332 0           TC      NVSBWAIT
0334   REF   2 LAST 454       14,2511  51'550 0           INDEX   RUN
0335   REF   3 LAST 451       14,2512  53'554 0           DXCH    TAZEL1
0336   REF  30 LAST 454       14,2513  52 334 1           DXCH    DSPTEM1

0337   REF   1                14,2514  0 2554 1           TC      CHECKLD              R1  +- XXX.XX    AZIMUTH IN DEGREES
0338                          14,2515   00661 0           OCT     00661                R2  +- XX.XXX    ELEVATION IN DEGREES
0339   REF  10 LAST 453       14,2516  1 2745 1           TCF     ENDTEST              R3       0000X   TARGET NUMBER 1 OR 2

0340   REF  31 LAST 454       14,2517  52 334 1           DXCH    DSPTEM1              TAZEL1       TARGET 1 AZIMUTH
0341   REF   3 LAST 454       14,2520  51'550 0           INDEX   RUN
0342   REF   4 LAST 454       14,2521  53'554 0           DXCH    TAZEL1               TAZEL1 +2    TARGET 2 AZIMUTH
0343   REF   4 LAST 454       14,2522  11'550 1           CCS     RUN
0344                          14,2523  1 2527 1           TCF     +4
0345   REF  54 LAST 448       14,2524  3 7656 0  OPTRDRIN CAF     TWO                  SPECIAL ENTRY FOR RDR37511
0346   REF 165 LAST 426       14,2525  54 001 1           TS      L
0347   REF   2 LAST 444       14,2526  1 2505 1           TCF     OPTDATA +4           MPAC    1ST PASS = 0    2ND PASS = 2
0348   REF  13 LAST 454       14,2527  0 1546 1           TC      QPLACE
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L       IMU PERFORMANCE TESTS 1                                                            USER'S OWN PAGE NO.  12

 0349                          14,2530   62545 1  LATAZCHK DLOAD  SL2                    CALLS FOR AZIMUTH (SM) AND LATITUDE
 0350   REF   3 LAST 453       14,2531   01511 0                  LATITUDE
 0351   REF  32 LAST 454       14,2532   06335 1           STODL  DSPTEM1 +1
 0352   REF   3 LAST 451       14,2533   01507 1                  AZIMUTH                ...NOT REALLY...

 0353                          14,2534   77424 0           RTB    EXIT
 0354   REF   1                14,2535   33410 1                  1STO2S                 FRACTION OF REVOLUTION TO 2S COMPLEMENT

 0355   REF 566 LAST 445       14,2536  56 140 1           XCH    MPAC                   AZIMUTH MUST BE 135 DEGREES  R1 = +13500
 0356   REF  33 LAST 455       14,2537  54 333 0           TS     DSPTEM1                   FOR SXT-NB-IMU FINE ALIGNMENT TEST
 0357   REF   2 LAST 454       14,2540  0 2554 1           TC     CHECKLD                R1   +- XXX.XX     AZIMUTH IN DEGREES (SM)
 0358                          14,2541   00661 0           OCT    00661                  R2   +- XX.XXX     LATITUDE IN DEGREES
 0359   REF  11 LAST 454       14,2542  1 2745 1           TCF    ENDTEST                R3                 NOT USED

 0360   REF  19 LAST 454       14,2543  0 6000 1           TC     INTPRET
 0361                          14,2544   45135 1           SLOAD  RTB
 0362   REF  34 LAST 455       14,2545   00334 0                  DSPTEM1
 0363   REF  13 LAST 451       14,2546   33345 0                  CDULOGIC               BACK TO FRACTION OF REVOLUTION
 0364   REF   4 LAST 455       14,2547   01507 1           STORE  AZIMUTH

 0365                          14,2550   60535 1           SLOAD  SR2
 0366   REF  35 LAST 455       14,2551   00335 1                  DSPTEM1 +1
 0367   REF   4 LAST 455       14,2552   01511 0           STORE  LATITUDE
 0368                          14,2553   77616 0           RVQ


 0369                          14,2554  0 0006 1  CHECKLD  EXTEND
 0370   REF   1                14,2555  23'545 1           QXCH   QPLAC

 0371   REF   2 LAST 455       14,2556  51'545 1           INDEX  QPLAC
 0372   REF 315 LAST 447       14,2557  3 0000 1           CA     A
 0373   REF   5 LAST 396       14,2560  0 5107 1           TC     NVSUB
 0374   REF   1                14,2561  1 2573 0           TCF    CHECKLD1

 0375   REF   8 LAST 439       14,2562  0 5274 0           TC     FLASHON

 0376   REF  23 LAST 444       14,2563  0 5140 1           TC     ENDIDLE                CHANGE R1  V21 N61 E  +- XXX.XX E
 0377                          14,2564  1 2567 0           TCF    +3                     CHANGE R2  V22 N61 E  +- XX.XXX E
 0378                          14,2565  1 2571 1           TCF    +4                     VERIFY, THEN PROCEED WITH VERB 33 ENTER
 0379   REF   3 LAST 455       14,2566  1 2556 1           TCF    CHECKLD +2
 0380   REF   3 LAST 455       14,2567  51'545 1           INDEX  QPLAC
 0381                          14,2570  0 0001 0           TC     1
 0382   REF   4 LAST 455       14,2571  51'545 1           INDEX  QPLAC
 0383                          14,2572  0 0002 0           TC     2

 0384   REF   1                14,2573  3 2575 1  CHECKLD1 CAF    CHECKLD2
 0385   REF   4 LAST 397       14,2574  0 5327 1           TC     NVSUBUSY
 0386   REF   4 LAST 455       14,2575   30556 1  CHECKLD2 CADR   CHECKLD +2
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0387                     14,2576  0 0006 1  POSNJUMP EXTEND                 POSITIONS FOR SXTNBIMU
0388  REF  14 LAST 454   14,2577  23'546 1           QXCH    QPLACE

0389  REF   2 LAST 444   14,2600  51'544 0           INDEX   POSITON
0390                     14,2601  1 2602 0           TCF     +1
0391  REF  12 LAST 455   14,2602  1 2745 1           TCF     ENDTEST
0392  REF   1            14,2603  1 2610 0           TCF     POS1
0393  REF   1            14,2604  1 2615 0           TCF     POS2
0394  REF   1            14,2605  1 2633 1           TCF     POS3
0395  REF   1            14,2606  1 2654 0           TCF     POS4
0396  REF   1            14,2607  1 2706 0           TCF     POS5


0397  REF 114 LAST 447   14,2610  3 7657 1  POS1     CAF     ONE            XSM = V      YSM = SW     ZSM = SE
0398  REF   3 LAST 446   14,2611  55'542 1           TS      PIPNDX
0399  REF  55 LAST 454   14,2612  3 7656 0           CAF     TWO
0400  REF   4 LAST 456   14,2613  55'543 0           TS      PIPNDX +1      MONITOR PIPAY AND PIPAZ
0401  REF  15 LAST 456   14,2614  0 1546 1           TC      QPLACE


0402  REF  20 LAST 455   14,2615  0 6000 1  POS2     TC      INTPRET        XSM = SE     YSM = SW     ZSM = -V
0403                     14,2616   57575 1           VLOAD   VCOMP
0404  REF  14 LAST 453   14,2617   01401 0                   XSM
0405                     14,2620   77715 1           PDVL
0406  REF   3 LAST 416   14,2621   01415 0                   ZSM
0407  REF  15 LAST 456   14,2622   23401 0           STOVL   XSM
0408                     14,2623   77626 0           STADR
0409  REF   4 LAST 456   14,2624   76362 1           STORE   ZSM
0410                     14,2625   77776 1           EXIT
0411  REF 150 LAST 447   14,2626  3 7665 0           CAF     ZERO
0412  REF   5 LAST 456   14,2627  55'542 1           TS      PIPNDX
0413  REF 115 LAST 456   14,2630  3 7657 1           CAF     ONE
0414  REF   6 LAST 456   14,2631  55'543 0           TS      PIPNDX +1      MONITOR PIPAX AND PIPAY
0415  REF  16 LAST 456   14,2632  0 1546 1           TC      QPLACE


0416  REF  21 LAST 456   14,2633  0 6000 1  POS3     TC      INTPRET        XSM = SE     YSM = V      ZSM = SW
0417                     14,2634   63375 0           VLOAD   PDVL
0418  REF  16 LAST 456   14,2635   01401 0                   XSM
0419  REF   6 LAST 449   14,2636   01407 0                   YSM
0420                     14,2637   77715 1           PDVL
0421  REF   5 LAST 456   14,2640   01415 0                   ZSM
0422  REF  17 LAST 456   14,2641   23401 0           STOVL   XSM

0423                     14,2642   77626 0           STADR
0424  REF   6 LAST 456   14,2643   54362 1           STOVL   ZSM
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 0425                         14,2644   77626 0             STADR
 0426   REF    7 LAST 456     14,2645   76370 1             STORE   YSM
 0427                         14,2646   77776 1             EXIT
 0428   REF 151 LAST 456      14,2647  3 7665 0             CAF     ZERO
 0429   REF    7 LAST 456     14,2650  55'542 1             TS      PIPNDX
 0430   REF   56 LAST 456     14,2651  3 7656 0             CAF     TWO
 0431   REF    8 LAST 457     14,2652  55'543 0             TS      PIPNDX +1        MONITOR PIPAX AND PIPAZ
 0432   REF   17 LAST 456     14,2653  0 1546 1             TC      QPLACE


 0433   REF   14 LAST 377     14,2654  3 7653 0  POS4       CAF     BIT5             OPTION TO ALIGN SM TO SPECIFIED ANGLES
 0434   REF   21 LAST 448     14,2655  6 0104 1             AD      FIXLOC
 0435   REF   22 LAST 457     14,2656  50 104 1             INDEX   FIXLOC
 0436   REF   12 LAST 448     14,2657  54 050 0             TS      S1               BASE ADDRESS GIMBAL ANGLES
 0437   REF    1              14,2660  3 3656 1             CAF     V25N22E          R1  +- XXX.XX   OUTER GIMBAL ANGLE
 0438   REF   33 LAST 454     14,2661  0 5332 0             TC      NVSBWAIT         R2  +- XXX.XX   INNER GIMBAL ANGLE
 0439   REF   24 LAST 455     14,2662  0 5140 1             TC      ENDIDLE          R3  +- XXX.XX   MIDDLE GIMBAL ANGLE
 0440   REF   13 LAST 456     14,2663  1 2745 1             TCF     ENDTEST
 0441                         14,2664  1 2660 1             TCF     -4
 0442   REF   10 LAST 428     14,2665  3 0400 0             CA      THETAD           SET UP ANGLES FOR SMNB
 0443   REF   23 LAST 457     14,2666  50 104 1             INDEX   FIXLOC
 0444                         14,2667  54 024 0             TS      24
 0445   REF   11 LAST 457     14,2670  3 0401 1             CA      THETAD +1
 0446   REF   24 LAST 457     14,2671  50 104 1             INDEX   FIXLOC
 0447                         14,2672  54 020 1             TS      20
 0448   REF   12 LAST 457     14,2673  3 0402 1             CA      THETAD +2
 0449   REF   25 LAST 457     14,2674  50 104 1             INDEX   FIXLOC
 0450                         14,2675  54 022 0             TS      22

 0451   REF   22 LAST 456     14,2676  0 6000 1             TC      INTPRET
 0452                         14,2677   47024 1             RTB     CALL
 0453   REF    1              14,2700   32766 1                     TRANSPSE         EARTH REF WRT NAV BASE
 0454   REF    1              14,2701   33000 1                     SMD/EREF         STABLE MEMBER DESIRED WRT EARTH REF
 0455                         14,2702   77624 1             RTB
 0456   REF    2 LAST 457     14,2703   32766 1                     TRANSPSE         BACK TO NAV BASE WRT TO EARTH REF
 0457                         14,2704   77776 1             EXIT
 0458   REF   18 LAST 457     14,2705  0 1546 1             TC      QPLACE
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L        IMU PERFORMANCE TESTS 1                                                   USER'S OWN PAGE NO.  15

 0459   REF  19 LAST 457     14,2706  3 1546 1  POS5      CA      QPLACE        OPTION TO ALIGN SM TO ANY ORIENTATION
 0460   REF   3 LAST 454     14,2707  55'551 0            TS      STOREPL         WRT EARTH REFERENCE FRAME

 0461   REF   3 LAST 454     14,2710  0 2501 1            TC      OPTDATA       LOAD YSM AND ZSM AZIMUTH AND ELEVATION

 0462   REF  23 LAST 457     14,2711  0 6000 1            TC      INTPRET
 0463                        14,2712   77634 0            CALL
 0464   REF   2 LAST 448     14,2713   30350 1                    TAR/EREF      CALC YSM AND ZSM WRT EARTH REF. FRAME
 0465                        14,2714   41575 0            VLOAD   PUSH
 0466                        14,2715   00007 0                    6D
 0467   REF   8 LAST 457     14,2716   01407 0            STORE   YSM
 0468                        14,2717   76435 1            VXV     VSL1
 0469                        14,2720   00015 0                    12D
 0470   REF  18 LAST 456     14,2721   01401 0            STORE   XSM           XSM = (YSM) X (ZSM)
 0471                        14,2722   76435 1            VXV     VSL1
 0472                        14,2723   77626 0            STADR
 0473   REF   7 LAST 456     14,2724   76362 1            STORE   ZSM           ZSM = (XSM) X (YSM)
 0474                        14,2725   77776 1            EXIT

 0475   REF   4 LAST 458     14,2726  0 1551 1            TC      STOREPL
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L        IMU PERFORMANCE TESTS 1                                                             USER'S OWN PAGE NO.  16

 0476                          14,2727  0 0006 1  OGCZERO  EXTEND                            ZERO EARTH RATE TORQUING ANGLES
 0477    REF  20 LAST 458      14,2730  23'546 1           QXCH    QPLACE

 0478    REF  24 LAST 458      14,2731  0 6000 1           TC      INTPRET
 0479                          14,2732   77775 1           VLOAD
 0480    REF   6 LAST 453      14,2733   33042 1                   ZERODP                    VECTOR IN THIS CASE
 0481    REF   5 LAST 453      14,2734   01772 1           STORE   ERCOMP
 0482                          14,2735   77776 1           EXIT
 0483    REF  21 LAST 459      14,2736  0 1546 1           TC      QPLACE



 0484    REF  29 LAST 377      14,2737  3 7652 1  GMLCKCHK CAF     BIT6                      CHECK FOR GIMBAL LOCK  (MGA GREATER 70)
 0485    REF  61 LAST 403      14,2740  7 0322 0           MASK    DSPTAB +11D
 0486                          14,2741  0 0006 1           EXTEND
 0487                          14,2742  1 2744 0           BZF     +2
 0488    REF  14 LAST 457      14,2743  1 2745 1           TCF     ENDTEST
 0489    REF 271 LAST 448      14,2744  0 0002 0           TC      Q



 0490    REF   7 LAST 190      14,2745  3 7650 0  ENDTEST  CA      IMUSEFLG                  BIT8
 0491    REF   4 LAST 236      14,2746  6 7651 1           AD      RRUSEFLG                  BIT7
 0492    REF 316 LAST 455      14,2747  4 0000 0           CS      A
 0493                          14,2750  0 0004 0           INHINT
 0494    REF  23 LAST 447      14,2751  7 0061 1           MASK    STATE
 0495    REF  24 LAST 459      14,2752  54 061 1           TS      STATE

 0496    REF   4 LAST 278      14,2753  0 4667 1           TC      NEWMODEX
 0497                          14,2754   00000 1           OCT     00000

 0498    REF  43 LAST 453      14,2755  0 4063 0           TC      BANKCALL
 0499    REF   3 LAST 447      14,2756   27014 1           CADR    MKRELEAS                  RELEASE MARK SYSTEM
 0500    REF  13 LAST 440      14,2757  0 4437 0           TC      EJFREE
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L          IMU PERFORMANCE TESTS 1                                                         USER'S OWN PAGE NO.  17

 0501  REF 25 LAST 459   14,2760  0 6000 1  LEMLAB    TC      INTPRET
 0502                    14,2761    57575 1             VLOAD   VCOMP
 0503  REF  2 LAST 415   14,2762    33036 1                     YUNIT

 0504  REF  2 LAST 411   14,2763    01437 0             STORE   ZNB               XNB MATRIX USED IN CALCGA
 0505  REF 31 LAST 449   14,2764    23461 0             STOVL   STARAD +12D       STARAD MATRIX USED IN AXISGEN * SMDCALC
 0506  REF  2 LAST 415   14,2765    33040 0                     XUNIT

 0507  REF  4 LAST 411   14,2766    01423 0             STORE   XNB               *XNB*    *1     0     0* *V*
 0508  REF 32 LAST 460   14,2767    23445 0             STOVL   STARAD            *   *    *                * * *
 0509  REF  2 LAST 415   14,2770    33034 0                     ZUNIT             *YNB* =  *0     0     1* *S*
 0510  REF  2 LAST 411   14,2771    01431 0             STORE   YNB               *   *    *                * * *
 0511  REF 33 LAST 460   14,2772    01453 1             STORE   STARAD +6         *ZNB*    *0    -1     0* *E*
 0512                    14,2773    77776 1             EXIT

 0513  REF  3 LAST 456   14,2774  4 1544 1              CS      POSITON
 0514  REF 18 LAST 454   14,2775  6 6165 0              AD      THREE
 0515                    14,2776  0 0006 1              EXTEND
 0516                    14,2777  1 3001 1              BZF     +2
 0517  REF  1            14,3000  1 3014 0              TCF     LEMLAB1

 0518  REF 26 LAST 460   14,3001  0 6000 1              TC      INTPRET
 0519                    14,3002    57575 1             VLOAD   VCOMP
 0520  REF  5 LAST 460   14,3003    01423 0                     XNB
 0521                    14,3004    77715 1             PDVL                      *XNB*    * 0   -1      0* *V*
 0522  REF  3 LAST 460   14,3005    01437 0                     ZNB               *   *    *                 * * *
 0523  REF  6 LAST 460   14,3006    01423 0             STORE   XNB               *YNB* =  * 0    0      1* *S*
 0524  REF 34 LAST 460   14,3007    23445 0             STOVL   STARAD            *   *    *                 * * *
 0525                    14,3010    77626 0             STADR                     *ZNB*    *-1    0      0* * *
 0526  REF  4 LAST 460   14,3011    76340 1             STORE   ZNB
 0527  REF 35 LAST 460   14,3012    01461 0             STORE   STARAD +12D
 0528                    14,3013    77776 1             EXIT

 0529  REF 44 LAST 459   14,3014  0 4063 0  LEMLAB1   TC      BANKCALL
 0530  REF 11 LAST 453   14,3015    26716 0             CADR    IMUSTALL          INSURE IMUZERO COMPLETION

 0531  REF 15 LAST 459   14,3016  1 2745 1              TCF     ENDTEST

 0532  REF  2 LAST 444   14,3017  0 2576 1              TC      POSNJUMP          SET UP STABLE MEMBER DESIRED COORDINATES
 0533  REF 10 LAST 445   14,3020  0 5401 1              TC      FREEDSP           FREE DISPLAY SYSTEM
 0534  REF  2 LAST 444   14,3021  0 2247 1              TC      PUTPOSX           TO COARSE ALIGN STABLE MEMBER

 0535  REF  2 LAST 444   14,3022  0 2737 0              TC      GMLCKCHK

 0536  REF 45 LAST 460   14,3023  0 4063 0              TC      BANKCALL
 0537  REF  3 LAST 444   14,3024    26227 1             CADR    IMUFINE           FINE ALIGN MODE
 0538  REF 46 LAST 460   14,3025  0 4063 0              TC      BANKCALL
 0539  REF 12 LAST 460   14,3026    26716 0             CADR    IMUSTALL
 0540  REF 16 LAST 460   14,3027  1 2745 1              TCF     ENDTEST
 0541    REF  12 LAST 425      14,3030  3 0032 0           CA      CDUX
 0542    REF  26 LAST 457      14,3031  50 104 1           INDEX   FIXLOC
 0543                          14,3032  54 024 0           TS      24
 0544    REF   5 LAST 425      14,3033  3 0033 1           CA      CDUY
 0545    REF  27 LAST 461      14,3034  50 104 1           INDEX   FIXLOC
 0546                          14,3035  54 020 1           TS      20
 0547    REF  10 LAST 425      14,3036  3 0034 0           CA      CDUZ
 0548    REF  28 LAST 461      14,3037  50 104 1           INDEX   FIXLOC
 0549                          14,3040  54 022 0           TS      22

 0550    REF  15 LAST 457      14,3041  3 7653 0           CAF     BIT5
 0551    REF  29 LAST 461      14,3042  6 0104 1           AD      FIXLOC
 0552    REF  30 LAST 461      14,3043  50 104 1           INDEX   FIXLOC
 0553    REF  13 LAST 457      14,3044  54 050 0           TS      S1

 0554    REF   2 LAST 445      14,3045  0 2263 1           TC      SMDCALC         TO FINE ALIGN STABLE MEMBER

 0555    REF  27 LAST 460      14,3046  0 6000 1           TC      INTPRET         IF EARTH RATE COMPENSATION DESIRED
 0556                          14,3047    77624 1          RTB
 0557    REF   3 LAST 453      14,3050    33342 1                  LOADTIME
 0558    REF   5 LAST 453      14,3051    01565 0          STORE   TMARK
 0559                          14,3052    77776 1          EXIT

 0560    REF   4 LAST 445      14,3053  4 1512 1           CS      EROPTN
 0561    REF  57 LAST 457      14,3054  6 7656 0           AD      TWO
 0562                          14,3055  0 0006 1           EXTEND
 0563                          14,3056  1 3060 0           BZF     +2

 0564    REF   3 LAST 445      14,3057  1 2051 0           TCF     ERFINAL +2

 0565    REF  47 LAST 460      14,3060  0 4063 0           TC      BANKCALL
 0566    REF   1               14,3061    35235 0          CADR    SAMODRTN        RETURN TO SEMI-AUTOMATIC MODING TEST
 0567    REF    1               14,3062  3 3674 1  RDR37511 CAF     RDRRETN         RENDEZVOUS RADAR AND ANTENNA TRACKING
 0568    REF   22 LAST 459      14,3063  55'546 0           TS      QPLACE          TO RETURN FROM OPTDATA

 0569    REF   48 LAST 461      14,3064  0 4063 0           TC      BANKCALL
 0570    REF    2 LAST 260      14,3065   20247 1           CADR    RRZERO

 0571    REF   49 LAST 462      14,3066  0 4063 0           TC      BANKCALL
 0572    REF    2 LAST 264      14,3067   23001 1           CADR    AURLOKON        OPERATOR DECISION TO LOCK ON OR NOT

 0573    REF    1               14,3070  1 2524 1  RDR1     TCF     OPTRDRIN        CALL FOR AZIMUTH AND ELEVATION

 0574    REF   50 LAST 462      14,3071  0 4063 0           TC      BANKCALL
 0575    REF    4 LAST 260      14,3072   26712 1           CADR    RADSTALL
 0576    REF   51 LAST 397      14,3073  1 4440 1           TCF     ENDOFJOB

 0577    REF   28 LAST 461      14,3074  0 6000 1           TC      INTPRET
 0578                           14,3075   77170 1           AXT,1   AXT,2           SET UP X1 AND X2 FOR TAR/EREF
 0579                           14,3076   00000 1                   0
 0580                           14,3077   00006 1                   6
 0581                           14,3100   77634 0           CALL
 0582    REF    3 LAST 458      14,3101   30353 1                   TAR/EREF +3     LINE-OF-SIGHT WRT EARTH REF FRAME
 0583                           14,3102   64375 1           VLOAD   MXV
 0584                           14,3103   00015 0                   12D             LINE-OF-SIGHT WRT EARTH REF FRAME
 0585    REF   19 LAST 458      14,3104   01401 0                   XSM             TO STABLE MEMBER PRESENT FRAME
 0586                           14,3105   77772 0           VSL1
 0587    REF    4 LAST 242      14,3106   36416 1           STCALL  RRTARGET
 0588    REF    1               14,3107   20306 0                   RRDESSM

 0589    REF    1               14,3110  1 3115 0           TCF     37511ALM
 0590    REF   51 LAST 462      14,3111  0 4063 0           TC      BANKCALL
 0591    REF    5 LAST 462      14,3112   26712 1           CADR    RADSTALL
 0592    REF   52 LAST 462      14,3113  1 4440 1           TCF     ENDOFJOB
 0593    REF   53 LAST 462      14,3114  1 4440 1           TCF     ENDOFJOB



 0594    REF   28 LAST 434      14,3115  0 5413 1  37511ALM TC      ALARM
 0595                           14,3116   00524 1           OCT     524
 0596    REF   54 LAST 462      14,3117  1 4440 1           TCF     ENDOFJOB



 0597    REF  152 LAST 457      14,3120  4 7665 1  RDRINIT  CS      ZERO
 0598    REF    5 LAST 461      14,3121  55'512 1           TS      EROPTN
 0599    REF    2 LAST 267      14,3122  1 2002 0           TCF     AOTNBIMU +2
```

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0600  REF  13 LAST 439    14,3123  0 5317 1  MISALIGN TC      GRABWAIT         DISPLAY SYSTEM WAS FREED
0601  REF 153 LAST 462    14,3124  3 7665 0           CAF     ZERO
0602  REF   6 LAST 454    14,3125  55'537 0           TS      NDXCTR
0603  REF   7 LAST 463    14,3126  51'537 1  BBBB     INDEX   NDXCTR
0604  REF  31 LAST 454    14,3127  4 1674 1           CS      GENPL +68D
0605  REF   8 LAST 463    14,3130  51'537 1           INDEX   NDXCTR
0606  REF  32 LAST 463    14,3131  27'702 1           ADS     GENPL +74D
0607  REF   1             14,3132  3 3662 0           CAF     63DEC
0608  REF   9 LAST 463    14,3133  6 1537 1           AD      NDXCTR
0609  REF 317 LAST 459    14,3134  10 000 0           CCS     A
0610  REF  19 LAST 460    14,3135  4 6165 1           CS      THREE
0611  REF  10 LAST 463    14,3136  27'537 0           ADS     NDXCTR
0612  REF   1             14,3137  1 3126 0           TCF     BBBB
0613  REF  11 LAST 463    14,3140  55'537 0           TS      NDXCTR


0614  REF  29 LAST 462    14,3141  0 6000 1  CCCC     TC      INTPRET
0615                      14,3142   70750 1           LXA,1   DLOAD*
0616  REF  12 LAST 463    14,3143   01537 1                   NDXCTR
0617  REF  33 LAST 463    14,3144   01701 0                   GENPL +72D,1
0618                      14,3145   77625 0           DSU
0619  REF  34 LAST 463    14,3146   01571 0                   GENPL
0620  REF  35 LAST 463    14,3147   03701 1           STORE   GENPL +72D,1
0621                      14,3150   77776 1           EXIT
0622  REF  13 LAST 463    14,3151  4 1537 0           CS      NDXCTR
0623  REF   1             14,3152  6 3663 1           AD      69DEC
0624  REF 318 LAST 463    14,3153  10 000 0           CCS     A
0625  REF  20 LAST 463    14,3154  3 6165 0           CAF     THREE
0626  REF  14 LAST 463    14,3155  27'537 0           ADS     NDXCTR
0627  REF   1             14,3156  1 3141 1           TCF     CCCC
0628  REF   5 LAST 454    14,3157  55'550 1           TS      RUN
0629  REF  21 LAST 463    14,3160  3 6165 0           CAF     THREE
0630  REF  15 LAST 463    14,3161  55'537 0           TS      NDXCTR


0631  REF  30 LAST 463    14,3162  0 6000 1  DDDD     TC      INTPRET
0632                      14,3163   77775 1           VLOAD
0633  REF   7 LAST 459    14,3164   33042 1                   ZERODP
0634                      14,3165   00031 0           STORE   24D
0635                      14,3166   00037 0           STORE   30D
0636                      14,3167   77735 0           SLOAD
0637  REF   1             14,3170   31660 0                   11DEC
0638                      14,3171   00041 1           STORE   32D
0639                      14,3172   77776 1           EXIT

0640  REF  31 LAST 463    14,3173  0 6000 1  DDDD1    TC      INTPRET
0641                      14,3174   70750 1           LXA,1   DLOAD*
0642  REF  16 LAST 463    14,3175   01537 1                   NDXCTR
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L        IMU PERFORMANCE TESTS 1                                              USER'S OWN PAGE NO.  21

0643     REF  36 LAST 463      14,3176    01701 0                   GENPL +72D,1
0644                           14,3177    41423 1          DSU*     PUSH
0645     REF  37 LAST 464      14,3200    01673 1                   GENPL +66D,1
0646                           14,3201    42742 0          SR1      DAD*
0647     REF  38 LAST 464      14,3202    01673 1                   GENPL +66D,1
0648     REF  39 LAST 464      14,3203    03701 1          STORE    GENPL +72D,1

0649                           14,3204    43312 0          SL2      DAD
0650                           14,3205    00031 0                   24D
0651                           14,3206    14031 0          STODL*   24D
0652     REF  40 LAST 464      14,3207    01701 0                   GENPL +72D,1
0653                           14,3210    63412 0          SL4      DSQ
0654                           14,3211    77615 0          DAD
0655                           14,3212    00033 1                   26D
0656                           14,3213    00033 1          STORE    26D
0657                           14,3214    77776 1          EXIT
0658     REF   6 LAST 463      14,3215   31'550 0          CAE      RUN
0659     REF  17 LAST 463      14,3216   6 1537 1          AD       NDXCTR
0660                           14,3217   4 0000 0          COM
0661     REF   2 LAST 463      14,3220   6 3662 0          AD       63DEC
0662     REF 319 LAST 463      14,3221   10 000 0          CCS      A
0663     REF  14 LAST 377      14,3222   3 6162 1          CAF      SIX
0664     REF  18 LAST 464      14,3223   27'537 0          ADS      NDXCTR
0665     REF   1               14,3224   1 3173 0          TCF      DDDD1
0666     REF   7 LAST 464      14,3225   6 1550 0          AD       RUN
0667     REF  19 LAST 464      14,3226   55'537 0          TS       NDXCTR


0668     REF  32 LAST 463      14,3227   0 6000 1  EEEE    TC       INTPRET
0669                           14,3230    66740 1          LXC,1    SLOAD*
0670     REF  20 LAST 464      14,3231    01537 1                   NDXCTR
0671     REF  41 LAST 464      14,3232    01604 1                   GENPL +11D,1
0672                           14,3233    00043 0          STORE    34D
0673                           14,3234    77745 1          DLOAD
0674                           14,3235    54206 1          PUSH     SL
0675                           14,3236    00211 0                   8D
0676                           14,3237    43265 1          BDDV     DAD
0677                           14,3240    00043 0                   34D
0678                           14,3241    00035 1                   28D
0679                           14,3242    06035 1          STODL    28D
0680                           14,3243    55261 1          SL       BDDV
0681                           14,3244    00207 1                   6
0682                           14,3245    00043 0                   34D
0683                           14,3246    42523 0          PDDL*    SL4
0684     REF  42 LAST 464      14,3247    01602 1                   GENPL +9D,1
0685                           14,3250    77605 1          DMP
0686                           14,3251    77615 0          DAD
0687                           14,3252    00037 0                   30D
0688                           14,3253    00037 0          STORE    30D
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0689                           14,3254    77776 1       EXIT
0690   REF  21 LAST 464        14,3255   4 1537 0       CS       NDXCTR
0691   REF   1                 14,3256   6 3661 0       AD       60DEC
0692   REF   8 LAST 464        14,3257   6 1550 0       AD       RUN
0693   REF 320 LAST 464        14,3260   10 000 0       CCS      A
0694   REF  15 LAST 464        14,3261   3 6162 1       CAF      SIX
0695   REF  22 LAST 465        14,3262   27'537 0       ADS      NDXCTR
0696   REF   1                 14,3263   1 3227 1       TCF      EEEE


0697   REF  33 LAST 464        14,3264   0 6000 1       TC       INTPRET
0698                           14,3265    41345 0       DLOAD    DMP
0699                           14,3266    00031 0                24D
0700                           14,3267    00037 0                30D
0701                           14,3270    41325 0       PDDL     DMP
0702                           14,3271    00033 1                26D
0703                           14,3272    00035 1                28D
0704                           14,3273    77625 0       DSU
0705                           14,3274    63525 0       PDDL     DSQ
0706                           14,3275    00031 0                24D
0707                           14,3276    65342 1       SR1      PDDL
0708                           14,3277    00041 1                32D
0709                           14,3300    41261 1       SL       DMP
0710                           14,3301    00212 0                11
0711                           14,3302    00033 1                26D
0712                           14,3303    55225 1       DSU      BDDV
0713                           14,3304    54205 1       DMP      SL
0714   REF   1                 14,3305    31673 1                KKKK
0715                           14,3306    00204 1                3
0716   REF   9 LAST 353        14,3307    00337 0       STORE    DSPTEM2
0717                           14,3310    77776 1       EXIT

0718   REF   4 LAST 460        14,3311   3 1544 0       CA       POSITON
0719   REF  10 LAST 465        14,3312   54 340 1       TS       DSPTEM2 +2

0720   REF   1                 14,3313   3 3654 0       CAF      V06N66E
0721   REF  34 LAST 457        14,3314   0 5332 0       TC       NVSBWAIT
0722   REF   9 LAST 455        14,3315   0 5274 0       TC       FLASHON
0723   REF  25 LAST 457        14,3316   0 5140 1       TC       ENDIDLE
0724   REF  17 LAST 460        14,3317   1 2745 1       TCF      ENDTEST
0725   REF  22 LAST 463        14,3320   3 6165 0       CAF      THREE
0726   REF   9 LAST 465        14,3321   55'550 1       TS       RUN
0727   REF 154 LAST 463        14,3322   3 7665 0       CAF      ZERO
0728   REF   1                 14,3323   1 3161 0       TCF      DDDD -1
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L        IMU PERFORMANCE TESTS 1                                                           USER'S OWN PAGE NO.  23

R0729    THIS REVISION REFLECTS CHANGES AS OF
R0730     1/31/66
R0731    ENGINE ON/OFF NOW IN CHANNEL ELEVEN.  THE BITS FOR EACH CHANNEL GET TURNED ON ALL AT ONCE.  THEY STAY ON UNTIL
R0733     :ENTER:IS PUSHED.  THEN THEY ALL GO OUT AND THE NEXT CHANNEL:S BITS ARE TURNED ON.
R0735    CHANNEL 5  BITS 1-8
R0736    CHANNEL 6  BITS 1-8
R0737    CHANNEL 11 BITS  13,14
R0738    CHANNEL 12 BITS 9-14
R0739    FOLLOWING THE CHANNEL 12 TESTS ENTER IS PRESSED.  CHANNEL 12 IS SET TO ZERO AND THE NEXT TEST BEGUN. LOW9
R0741    GOES IN LOCATION (COUNTER) 55.
R0742    INCREASE THROTTLE RATE DESCENT ENGINE
R0743    :ENTER: NOW CAUSES THE CONTENTS OF 55 TO BE MADE NEGATIVE
R0744    DECREASE THROTTLE RATE DESCENT ENGINE
R0745    THE NEXT :ENTER: ZEROS THE REGISTER AND SENDS A PULSE TRAIN (HERE ALTERN
R0746    ZEROS FOR CLARITY) TO THE ALTITUDE METER.
R0747    THE NEXT :ENTER: WILL ADVANCE THE TEST TO THE ALTITUDE RATE METER TEST.
R0748    THE NEXT :ENTER : WILL TERMINATE THE TEST.


 0749    REF  26 LAST 331      14,3324  3 7637 1  SAUTOIFS CA       POSMAX
 0750    REF   1               14,3325  55'576 0           TS       NOBITS
 0751    REF 155 LAST 465      14,3326  3 7665 0           CA       ZERO
 0752    REF   1               14,3327  55'577 1           TS       CHAN
 0753    REF   1               14,3330  55'575 0           TS       TEMP
 0754    REF   1               14,3331  0 3333 1           TC       DINO
 0755    REF   2 LAST 466      14,3332  25'577 0  BACK1    INCR     CHAN

 0756    REF   3 LAST 466      14,3333  51'577 0  DINO     INDEX    CHAN
 0757    REF   1               14,3334  3 3336 1           CA       SAUTLOCS
 0758    REF   4 LAST 257      14,3335  1 4067 0           TCF      SWCALL
 0759    REF   1               14,3336   31352 1  SAUTLOCS CADR     CHAN5D
 0760    REF   1               14,3337   31370 1           CADR     CHAN6D
 0761    REF   1               14,3340   31376 1           CADR     CHAN11D
 0762    REF   1               14,3341   31410 0           CADR     CHAN12D
 0763    REF   1               14,3342   31422 1           CADR     PTITRDE
 0764    REF   1               14,3343   31447 1           CADR     PTDTRDE
 0765    REF   1               14,3344   31524 0           CADR     ALTMET
 0766    REF   1               14,3345   31551 1           CADR     ALTRMET
 0767    REF  18 LAST 465      14,3346   30745 1           CADR     ENDTEST
 0768    REF   2 LAST 466      14,3347   31454 0  THROTADD CADR     PTDTRDE +5
 0769    REF   2 LAST 466      14,3350   31527 0  METERADD CADR     ALTMET +3
 0770    REF   2 LAST 466      14,3351   31554 1  MRATEADD CADR     ALTRMET +3
 0771    REF   9 LAST 432      14,3352  3 7664 1  CHAN5D   CA       FIVE
 0772    REF  36 LAST 455      14,3353  54 333 0           TS       DSPTEM1
 0773    REF   8 LAST 377      14,3354  3 5235 0  2ENTRY   CA       LOW8             CHANNEL 6 RETURNS HERE
 0774    REF  37 LAST 466      14,3355  54 334 1           TS       DSPTEM1 +1
 0775                          14,3356  0 0006 1           EXTEND
 0776    REF   2 LAST 466      14,3357  5 1575 1           INDEX    TEMP
 0777                          14,3360  01 005 0           WRITE    5
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L         IMU PERFORMANCE TESTS 1                                                                USER'S OWN PAGE NO.  24

 0778   REF   1                 14,3361  3 3643 0  3ENTRY    CA      V04N30D          CH11,12 RETURN HERE TO USE THE DISPLAY
 0779   REF  35 LAST 465        14,3362  0 5332 0            TC      NVSBWAIT
 0780   REF   1                 14,3363  3 3650 1  4ENTRY    CAF     WAITER           WAITER IS 03300
 0781   REF  36 LAST 467        14,3364  0 5332 0            TC      NVSBWAIT
 0782   REF  26 LAST 465        14,3365  0 5140 1            TC      ENDIDLE
 0783   REF  19 LAST 466        14,3366  0 2745 0            TC      ENDTEST
 0784   REF   1                 14,3367  0 3332 0            TC      BACK1

 0785   REF   3 LAST 466        14,3370  25'575 1  CHAN6D    INCR    TEMP
 0786   REF  38 LAST 466        14,3371  24 333 1            INCR    DSPTEM1
 0787   REF 156 LAST 466        14,3372  3 7665 0            CAF     ZERO
 0788                           14,3373  0 0006 1            EXTEND
 0789                           14,3374  01 005 0            WRITE   5                GET RID OF CHANNEL 5 BITS
 0790   REF   1                 14,3375  0 3354 0            TC      2ENTRY
 0791   REF   1                 14,3376  3 7662 1  CHAN11D   CA      OCT11
 0792   REF  39 LAST 467        14,3377  54 333 0            TS      DSPTEM1
 0793   REF   1                 14,3400  3 7700 1            CA      BIT13-14
 0794   REF  40 LAST 467        14,3401  54 334 1            TS      DSPTEM1 +1
 0795                           14,3402  0 0006 1            EXTEND
 0796                           14,3403  05 011 1            WOR     11               WOR IS NON EXCLUSIVE OR
 0797   REF 157 LAST 467        14,3404  3 7665 0            CAF     ZERO
 0798                           14,3405  0 0006 1            EXTEND
 0799                           14,3406  01 006 0            WRITE   6
 0800   REF   1                 14,3407  0 3361 0            TC      3ENTRY
 0801   REF   1                 14,3410  3 7661 1  CHAN12D   CA      OCT12
 0802   REF  41 LAST 467        14,3411  54 333 0            TS      DSPTEM1
 0803   REF   2 LAST 467        14,3412  4 7700 0            CS      BIT13-14
 0804                           14,3413  0 0006 1            EXTEND
 0805                           14,3414  03 011 1            WAND    11
 0806   REF   1                 14,3415  3 3646 0            CA      CH12BITS
 0807   REF  42 LAST 467        14,3416  54 334 1            TS      DSPTEM1 +1
 0808                           14,3417  0 0006 1            EXTEND
 0809                           14,3420  05 012 1            WOR     12
 0810   REF   2 LAST 467        14,3421  0 3361 0            TC      3ENTRY
 0811   REF   2 LAST 467        14,3422  4 3646 1  PTITRDE   CS      CH12BITS
 0812                           14,3423  0 0006 1            EXTEND
 0813                           14,3424  03 012 1            WAND    12
 0814   REF 158 LAST 467        14,3425  3 7665 0            CA      ZERO
 0815   REF  43 LAST 467        14,3426  54 333 0            TS      DSPTEM1
 0816   REF  44 LAST 467        14,3427  54 334 1            TS      DSPTEM1 +1
 0817   REF   4 LAST 467        14,3430  55'575 0            TS      TEMP
 0818   REF  37 LAST 454        14,3431  3 7657 1            CA      BIT1
 0819   REF   2 LAST 466        14,3432  55'576 0            TS      NOBITS
 0820                           14,3433  0 0004 0  PIT       INHINT
 0821   REF  66 LAST 446        14,3434  0 4536 0            TC      WAITLIST
 0822                           14,3435   03460 0            2CADR   THROTASK
C0822   REF   1                 14,3436   30005 1
 0823                           14,3437  0 0003 1            RELINT
 0824   REF   2 LAST 467        14,3440  3 3650 1            CA      WAITER
 0825   REF  37 LAST 467        14,3441  0 5332 0            TC      NVSBWAIT
 0826   REF  27 LAST 467   14,3442  0 5140 1            TC      ENDIDLE
 0827   REF  20 LAST 467   14,3443  0 2745 0            TC      ENDTEST
 0828   REF 159 LAST 467   14,3444  3 7665 0            CA      ZERO
 0829   REF   3 LAST 467   14,3445  55'576 0            TS      NOBITS
 0830   REF   2 LAST 467   14,3446  0 3332 0            TC      BACK1

 0831   REF 160 LAST 468   14,3447  3 7665 0  PTDTRDE   CA      ZERO
 0832   REF   2 LAST 442   14,3450  54 055 0            TS      THRUST
 0833   REF   1            14,3451  3 3347 1            CA      THROTADD
 0834   REF   1            14,3452  55'574 1            TS      TEMPADD
 0835   REF   8 LAST 446   14,3453  0 4416 0            TC      JOBSLEEP   THIS INHIBITS THE NEXT TASK UNTIL
R0836                                           CURRENT TASK HAS BEEN COMPLETED
 0837   REF  27 LAST 466   14,3454  3 7637 1            CA      POSMAX
 0838   REF   5 LAST 467   14,3455  55'575 0            TS      TEMP
 0839   REF  25 LAST 377   14,3456  3 7651 1            CA      BIT7
 0840   REF   1            14,3457  0 3433 0            TC      PIT
 0841   REF   4 LAST 468   14,3460  11'576 0  THROTASK  CCS     NOBITS     IS THIS TASK STILL REQ
 0842                      14,3461  0 3466 0            TC      +5         YES
 0843   REF   2 LAST 468   14,3462  3 1574 0            CA      TEMPADD    NO
 0844   REF   5 LAST 468   14,3463  55'576 0            TS      NOBITS
 0845   REF   7 LAST 445   14,3464  0 4422 1            TC      JOBWAKE
 0846   REF  57 LAST 445   14,3465  0 4602 1            TC      TASKOVER
 0847   REF   6 LAST 468   14,3466  11'575 0            CCS     TEMP
 0848   REF   1            14,3467  0 3502 0            TC      SOMETIME
 0849   REF   8 LAST 356   14,3470  3 5234 1            CA      LOW11
 0850   REF   3 LAST 468   14,3471  54 055 0  ALWAYS    TS      THRUST
 0851   REF  26 LAST 442   14,3472  3 7654 1            CA      BIT4
 0852                      14,3473  0 0006 1            EXTEND             A SMERZH FIX.
 0853                      14,3474  05 014 1            WOR     14
 0854   REF  30 LAST 459   14,3475  3 7652 1            CA      BIT6       320 MS.DELAY
 0855   REF  67 LAST 467   14,3476  0 4536 0            TC      WAITLIST
 0856                      14,3477   03460 0            2CADR   THROTASK
C0856   REF   2 LAST 467   14,3500   30005 1
 0857   REF  58 LAST 468   14,3501  0 4602 1            TC      TASKOVER
 0858   REF   9 LAST 468   14,3502  4 5234 0  SOMETIME  CS      LOW11
 0859   REF   1            14,3503  0 3471 0            TC      ALWAYS
 0860   REF   6 LAST 468   14,3504  11'576 0  ALTASK    CCS     NOBITS     IS TASK STILL REQ
 0861                      14,3505  0 3512 1            TC      +5
 0862   REF   3 LAST 468   14,3506  3 1574 0            CA      TEMPADD    NO
 0863   REF   7 LAST 468   14,3507  55'576 0            TS      NOBITS     ENABLES NEXT TASK
 0864   REF   8 LAST 468   14,3510  0 4422 1            TC      JOBWAKE
 0865   REF  59 LAST 468   14,3511  0 4602 1            TC      TASKOVER
 0866   REF   1            14,3512  3 3644 1            CA      ALBITS     ACTUAL TASK STARTS HERE
 0867   REF   2 LAST 165   14,3513  54 060 0            TS      ALTM
 0868   REF  16 LAST 377   14,3514  3 7655 0            CA      BIT3
 0869                      14,3515  0 0006 1            EXTEND
 0870                      14,3516  05 014 1            WOR     14
 0871   REF  31 LAST 468   14,3517  3 7652 1            CA      BIT6       320 MS. DELAY
 0872   REF  68 LAST 468   14,3520  0 4536 0            TC      WAITLIST
 0873                      14,3521   03504 0            2CADR   ALTASK
C0873   REF   1            14,3522   30005 1
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L          IMU PERFORMANCE TESTS 1                                                              USER'S OWN PAGE NO.  26

  0874    REF  60 LAST 468      14,3523  0 4602 1            TC      TASKOVER
  0875    REF   1               14,3524  3 3350 1  ALTMET    CA      METERADD
  0876    REF   4 LAST 468      14,3525  55'574 1            TS      TEMPADD
  0877    REF   9 LAST 468      14,3526  0 4416 0            TC      JOBSLEEP
  0878    REF 161 LAST 468      14,3527  3 7665 0            CA      ZERO
  0879    REF   7 LAST 468      14,3530  55'575 0            TS      TEMP
  0880    REF  27 LAST 468      14,3531  4 7654 0            CS      BIT4
  0881                          14,3532  0 0006 1            EXTEND
  0882                          14,3533  03 014 1            WAND    14
  0883                          14,3534  0 0004 0            INHINT
  0884    REF 116 LAST 456      14,3535  3 7657 1            CA      ONE
  0885    REF  69 LAST 468      14,3536  0 4536 0            TC      WAITLIST
  0886                          14,3537   03504 0            2CADR   ALTASK
 C0886    REF   2 LAST 468      14,3540   30005 1
  0887                          14,3541  0 0003 1            RELINT
  0888    REF   3 LAST 467      14,3542  3 3650 1            CA      WAITER
  0889    REF  38 LAST 467      14,3543  0 5332 0            TC      NVSBWAIT
  0890    REF  28 LAST 468      14,3544  0 5140 1            TC      ENDIDLE
  0891    REF  21 LAST 468      14,3545  0 2745 0            TC      ENDTEST
  0892    REF 162 LAST 469      14,3546  3 7665 0            CA      ZERO
  0893    REF   8 LAST 468      14,3547  55'576 0            TS      NOBITS
  0894    REF   3 LAST 468      14,3550  0 3332 0            TC      BACK1

  0895    REF   1               14,3551  3 3351 0  ALTRMET   CA      MRATEADD
  0896    REF   5 LAST 469      14,3552  55'574 1            TS      TEMPADD
  0897    REF  10 LAST 469      14,3553  0 4416 0            TC      JOBSLEEP
  0898    REF 117 LAST 469      14,3554  3 7657 1            CA      ONE
  0899    REF   8 LAST 469      14,3555  55'575 0            TS      TEMP                    TEMP WILL BE INDEXED TO ACQUIRE BIT2 INS
 C0900                                                                                      TEAD OF BIT3
  0901    REF  26 LAST 439      14,3556  3 7656 0            CA      BIT2
  0902                          14,3557  0 0006 1            EXTEND
  0903                          14,3560  05 014 1            WOR     14
  0904    REF   3 LAST 466      14,3561  0 3534 0            TC      ALTMET +8D
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P0905        THE AOT ANGLE CHECKING PROGRAM PROVIDES A SIMPLE VERIFICATION OF THE ACCURACY OF THE AOT.  THE IDEA IS TO
R0907   COMPUTE THE ANGLE BETWEEN TWO LINES OF SIGHT AS INDICATED BY THE AOT, WHICH IS WHAT THIS PROGRAM DOES.
R0909   INDEPENDENT KNOWLEDGE OF THE INCLUDED ANGLE PROVIDES A COMPARISON AND THUS A MEASURE OF THE AOT ACCURACY.
R0911        THE ISS NEED NOT BE ON TO RUN THIS PROGRAM.


 0912   REF  34 LAST 465      14,3562  0 6000 1  AOTANGCK TC      INTPRET
 0913                         14,3563   77414 0           SET     EXIT               IN CASE THE ISS IS OFF.
 0914   REF   6 LAST 449      14,3564   00065 1                   COAROFIN
 0915   REF   3 LAST 445      14,3565  0 2135 1           TC      FINDNAVB           FOR LOS1 AND LOS2.
 0916   REF  35 LAST 470      14,3566  0 6000 1           TC      INTPRET
 0917                         14,3567   47375 0           VLOAD   VXV
 0918   REF   2 LAST 447      14,3570   01601 1                   LOS1
 0919   REF   2 LAST 448      14,3571   01607 1                   LOS2
 0920                         14,3572   77646 0           ABVAL
 0921   REF  12 LAST 423      14,3573   22023 0           STOVL   SINTH              SINTH = ABVAL (VXV ).
 0922   REF   3 LAST 470      14,3574   01601 1                   LOS1
 0923                         14,3575   77641 1           DOT
 0924   REF   3 LAST 470      14,3576   01607 1                   LOS2
 0925   REF  10 LAST 423      14,3577   36021 1           STCALL  COSTH              COSTH = V.V
 0926   REF   8 LAST 423      14,3600   32440 0                   ARCTRIG
 0927                         14,3601   77624 1           RTB
 0928   REF   2 LAST 455      14,3602   33410 1                   1STO2S             DP 1S COMP TO SP 2S COMP.
 0929   REF   6 LAST 406      14,3603   00025 0           STORE   THETA
 0930                         14,3604   77776 1           EXIT
 0931   REF   1               14,3605  3 3675 0           CAF     THETAADR
 0932   REF  31 LAST 461      14,3606  6 0104 1           AD      FIXLOC
 0933   REF 567 LAST 455      14,3607  54 142 1           TS      MPAC +2
 0934   REF   1               14,3610  3 3653 1           CAF     V06N03E            XXX.XX DEGREES IN R1.
 0935   REF  39 LAST 469      14,3611  0 5332 0           TC      NVSBWAIT
 0936   REF  22 LAST 469      14,3612  1 2745 1           TCF     ENDTEST
```

```
0937                                     E3             EBANK=  1400
0938                         14,3613  0 0004 0 ZEROERAS INHINT           PROGRAN BY MUNTZ TO ZERO ERASEABLE
09381   REF 163 LAST 469     14,3614  3 7665 0          CAF     ZERO
09382   REF   5 LAST 156     14,3615  54 026 1          TS      TIME3
0939    REF   1              14,3616  3 3642 1          CAF     OCT27
0940    REF  24 LAST 393     14,3617  54 003 0          TS      EBANK
0941                         14,3620  22 007 0 ZEROLP   ZL
0942    REF 321 LAST 465     14,3621  50 000 1          INDEX   A
0943                         14,3622  23'401 0          LXCH    1401
0944    REF  58 LAST 461     14,3623  6 7656 0          AD      TWO
0945    REF  25 LAST 471     14,3624  26 003 0          ADS     EBANK
0946    REF   9 LAST 466     14,3625  7 5235 1          MASK    LOW8
0947    REF 322 LAST 471     14,3626  10 000 0          CCS     A
0948    REF   1              14,3627  1 3620 1          TCF     ZEROLP
0949    REF  26 LAST 471     14,3630  10 003 0          CCS     EBANK
0950    REF   1              14,3631  1 3634 1          TCF     ZEROLP1
0951    REF  22 LAST 401     14,3632  0 4102 0          TC      POSTJUMP
0952    REF   2 LAST 306     14,3633   24000 1          CADR    SLAP1
0953                         14,3634  0 0003 1 ZEROLP1  RELINT
09531   REF 164 LAST 471     14,3635  3 7665 0          CAF     ZERO       KEEP T4RUPT GOING, BUT NOT CYCLING.
09532   REF   5 LAST 164     14,3636  54 350 0          TS      DSRUPTSW
0954                         14,3637  0 0004 0          INHINT
0955    REF 118 LAST 469     14,3640  4 7657 0          CS      ONE
0956    REF   2 LAST 471     14,3641  1 3620 1          TCF     ZEROLP
09565                        14,3642   00027 1 OCT27    OCT     27
```

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0958   REF   6 LAST 450                    E5            EBANK= OGC
0960                         14,3643   00430 0   V04N30D   OCT      00430
0961                         14,3644   52525 1   ALBITS    OCT      52525
0962                         14,3645   70707 0   THRSBITS  OCT      70707
0963   REF   8 LAST 443                   7661   OCT12     =        TEN
0964   REF   1                            7662   OCT11     =        NINE
0965                         14,3646   37400 1   CHI2BITS  OCT      37400
0966                         14,3647   00130 0   V01N30D   OCT      00130
0967                         14,3650   03300 1   WAITER    OCT      03300



0968                         14,3651   00130 0   V01N30E   OCT      00130                FOR FINDNAVB
0969                         14,3652   00530 1   V05N30E   OCT      00530                FOR OPTDATA
0970                         14,3653   00603 1   V06N03E   OCT      00603
0971                         14,3654   00666 1   V06N66E   OCT      00666
0972                         14,3655   02430 1   V24N30E   OCT      02430                FOR POSITION LOAD
0973                         14,3656   02522 0   V25N22E   OCT      02522                FOR POS4

0974                         14,3657   00013 0   11DEC     DEC      11
0975                         14,3660   00021 1   17DEC     DEC      17
0976                         14,3661   00074 1   60DEC     DEC      60
0977                         14,3662   00077 1   63DEC     DEC      63
0978                         14,3663   00105 0   69DEC     DEC      69                   FOR MISALIGN
0979                         14,3664   00110 1   72DEC     DEC      72                   FOR STORRSLT

0980                         14,3665   05670 0   30SEC     DEC      3000                 3000 X 10 MSEC
0981                         14,3666   13560 0   60SEC     DEC      6000                 6000 X 10 MSEC

0982   REF   7 LAST 472      14,3667   01500 0   OGCADR    ADRES    OGC                  FOR ZEROING
0983   REF  43 LAST 464      14,3670   01570 1   GENPLADI  ADRES    GENPL
0984   REF  44 LAST 472      14,3671   02570 1   GENPLADR  ECADR    GENPL                FOR POS4
0985                         14,3672   00322 1   KKKK      2DEC     210.39 B-14          1230 B-14 FOR CSM
C0985                        14,3673   14366 1
0986   REF   1               14,3674   03071 1   RDRRETN   ADRES    RDR1 +1              FOR RDR37511
0987   REF   7 LAST 470      14,3675   00024 1   THETAADR  ECADR    THETA
0988   REF  20 LAST 462      14,3676   01400 1   XSMADRX   ADRES    XSM                  FOR MAKEXSMD

0989                         14,3677   24365 1   SCALFTR   2DEC     .64                  FOR STORRSLT
C0989                        14,3700   30244 0
0990                         14,3701   07623 1   OMEG/MS   2DEC     .24339048            GYRO PULSES / 10 MSEC
C0990                        14,3702   26552 1
```

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P0991            THE FOLLOWING ROUTINE READS THE CLOCK AND SCALAR (CHANNELS 3 AND 4) INTO A AND L, INSURING THAT THE
R0993      DATA WAS NOT IN TRANSITION WHEN IT WAS READ.

 0994      REF    1                         5470            SETLOC ENDFAILF
 0995                             5470   0 0004 0  FINETIME INHINT                    RETURNS WITH INTERRUPT INHIBITED.
 0996                             5471   0 0006 1           EXTEND
 0997      REF    1               5472  00 004 0            READ    LOSCALAR
 0998      REF 166 LAST 454       5473  54 001 1            TS      L

 0999                             5474   0 0006 1           EXTEND                    SEE IF 2 READINGS AGREE. IF NOT, READ
 1000      REF    2 LAST 473      5475  06 004 0            RXOR    LOSCALAR          LOSCALAR AGAIN.
 1001                             5476   0 0006 1           EXTEND
 1002                             5477   1 5503 0           BZF     +4

 1003                             5500   0 0006 1           EXTEND                    IF CLOCK RIPPLED BEFORE, IT WONT NOW.
 1004      REF    3 LAST 473      5501  00 004 0            READ    LOSCALAR
 1005      REF 167 LAST 473       5502  54 001 1            TS      L

 1006      REF   28 LAST 468      5503   4 7637 0    +4     CS      POSMAX            IF LOW PART CONTAINS SOMETHING LESS THAN
 1007      REF 168 LAST 473       5504   6 0001 0           AD      L                 POSMAX, THE HIGH PART CAN BE READ SAFELY
 1008                             5505   0 0006 1           EXTEND
 1009      REF    4 LAST 445      5506   1 5471 1           BZF     FINETIME +1       TRY AGAIN - CONDITION WILL DISAPPEAR.

 1010                             5507   0 0006 1           EXTEND
 1011      REF    1               5510  00 003 1            READ    HISCALAR
 1012      REF 272 LAST 459       5511   0 0002 0           TC      Q

 1013                                       5512   ENDIMUF  =
L       IMU PERFORMANCE TESTS 1                                                            USER'S OWN PAGE NO.  31

 1014   REF   2 LAST 453               14,3703           SETLOC OMEG/MS +2
 1015   REF  52 LAST 462     14,3703  0 4063 0  REDYTORK TC     BANKCALL
 1016   REF  13 LAST 460     14,3704   26716 0           CADR   IMUSTALL
 1017   REF  23 LAST 470     14,3705  1 2745 1           TCF    ENDTEST

 1018   REF   2 LAST 444     14,3706  0 2727 1           TC     OGCZERO

 1019   REF  36 LAST 470     14,3707  0 6000 1           TC     INTPRET
 1020                        14,3710   77634 0           CALL
 1021   REF   2 LAST 444     14,3711   30405 0                  ERTHRVSE           SETS UP EARTHRATE ANGLES AND TIME
 1022                        14,3712   77776 1           EXIT
 1023   REF   1              14,3713  3 1617 0           CA     OPTNREG            INITIALIZE CDUNDX FOR PULSE CATCHING
 1024   REF   3 LAST 377     14,3714  6 7670 1           AD     NEG2               C(K) WAS 4 2 1 NOW C(A) IS 2 0 -1
 1025   REF   1              14,3715  55'616 0           TS     GYTOBETQ           C(K) = 2,0,-1 FOR  X,Y,Z.
 1026                        14,3716  0 0006 1           EXTEND
 1027                        14,3717  1 3722 1           BZF    +3
 1028   REF  59 LAST 471     14,3720  3 7656 0           CAF    TWO
 1029                        14,3721  0 3723 1           TC     +2
 1030   REF 119 LAST 471     14,3722  3 7657 1           CAF    ONE
 1031   REF   1              14,3723  55'672 1           TS     CDUNDX             C(K) = 1 FOR Y, 2 FOR Z CDU SELECT
 1032   REF  53 LAST 474     14,3724  0 4063 0           TC     BANKCALL
 1033   REF   1              14,3725   36545 0           CADR   ENABLE
 1034                                  14,3726  ENDIMUS1 EQUALS
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L        IMU PERFORMANCE TESTS 2                                                      USER'S OWN PAGE NO.   1

 0001                                  17,2000             BANK     17
 0002   REF  21 LAST 472                    E5             EBANK=  XSM


 0003   REF 165 LAST 471     17,2000  3 7665 0  IMUTEST  CA       ZERO
 00031  REF   2 LAST 376     17,2001  55'576 0           TS       DRIFTT
 00032  REF   1              17,2002  55'742 0           TS       GEOCOMPS
 00033  REF   1              17,2003  3 3626 0           CAF      1SECX
 00034  REF   1              17,2004  55'744 0           TS       1SECXT
 00038  REF  37 LAST 474     17,2005  0 6000 1  GEOIMUTT TC       INTPRET          OPTIMUM COMPASS COMES IN HERE
 0004                        17,2006   77634 0           CALL
 0005   REF   2 LAST 444     17,2007   30530 1                    LATAZCHK
 0006                        17,2010   77776 1           EXIT
 0009   REF 120 LAST 474     17,2011  3 7657 1           CA       ONE
 0010   REF   5 LAST 465     17,2012  55'544 1           TS       POSITON

 0011   REF  11 LAST 465     17,2013  54 340 1           TS       DSPTEM2 +2
 0012   REF  13 LAST 457     17,2014  54 400 1           TS       THETAD
 0013   REF  14 LAST 475     17,2015  54 401 0           TS       THETAD +1
 0014   REF  15 LAST 475     17,2016  54 402 0           TS       THETAD +2
 0015   REF  54 LAST 474     17,2017  0 4063 0           TC       BANKCALL
 0016   REF   3 LAST 444     17,2020   26000 0           CADR     IMUZERO
 0017   REF  55 LAST 475     17,2021  0 4063 0           TC       BANKCALL
 0018   REF  14 LAST 474     17,2022   26716 0           CADR     IMUSTALL
 0019   REF   1              17,2023  1 2243 1           TCF      ENDTEST1
 0020   REF 166 LAST 475     17,2024  3 7665 0  IMUBACK  CA       ZERO
 0021   REF  12 LAST 475     17,2025  54 337 1           TS       DSPTEM2 +1
 0022   REF  23 LAST 465     17,2026  55'537 0           TS       NDXCTR
 0023   REF   1              17,2027  55'574 1           TS       TORQNDX
 0024   REF   2 LAST 475     17,2030  55'575 0           TS       TORQNDX +1
 0026   REF   1              17,2031  3 3660 1           CAF      TESTTIME
 0028   REF  13 LAST 475     17,2032  54 336 0           TS       DSPTEM2
 0029   REF  56 LAST 475     17,2033  0 4063 0           TC       BANKCALL         ISS RETURNS IN COARSE ALIGN MODE TO
 0030   REF   3 LAST 449     17,2034   26055 0           CADR     IMUCOARS         ENABLE OPERATOR TO DECIDE WHAT TO DO
R0031   ABOUT GIMBAL LOCK
 0032   REF   1              17,2035  0 3567 0           TC       SHOWLD
 0033   REF   1              17,2036  0 3576 0           TC       SHOW


 0034   REF  57 LAST 475     17,2037  0 4063 0           TC       BANKCALL
 0035   REF  15 LAST 475     17,2040   26716 0           CADR     IMUSTALL
 0036   REF   2 LAST 475     17,2041  0 2243 0           TC       ENDTEST1
 0037   REF   1              17,2042  0 3344 1           TC       NBPOSPL
 0038   REF   1              17,2043  0 3077 1           TC       POSGMBL
 0039   REF   1              17,2044  0 2106 1           TC       PIPACHK          IF MGA IS 60DEG+ PROG WILL STAY IN COARS
C0040                                                                               ALIGN AND MEASURE VERTICAL PIPA RATE
 0041   REF   1              17,2045  0 3124 0           TC       FALNE
 0042   REF  58 LAST 475     17,2046  0 4063 0           TC       BANKCALL
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L         IMU PERFORMANCE TESTS 2                                                        USER'S OWN PAGE NO.   2

 0043     REF  16 LAST 475     17,2047    26716 0              CADR    IMUSTALL
 0044     REF   3 LAST 475     17,2050   1 2243 1              TCF     ENDTEST1
 00442    REF   2 LAST 475     17,2051   11'742 0              CCS     GEOCOMPS
 00443    REF   1              17,2052   0 2072 0              TC      JUMPLOAD
 0045     REF  38 LAST 475     17,2053   0 6000 1   GUESS      TC      INTPRET             CALCULATE -COS LATITUDE AND SIN LATITUDE
 0046                          17,2054    71545 0              DLOAD   COS                 FOR ESTIMATE
 0047     REF   5 LAST 455     17,2055    01511 0                      LATITUDE
 0048                          17,2056    72476 1              DCOMP   SL1
 0049     REF   1              17,2057    07573 1              STODL   WANGI
 0050     REF   6 LAST 476     17,2060    01511 0                      LATITUDE
 0051                          17,2061    72556 1              SIN     SL1
 0052     REF   1              17,2062    23571 0              STOVL   WANGO                LOAD TRANSITION MATRIX INTO ERASABLE
 00521    REF   1              17,2063    37630 0                      GEORGED
 00522    REF   1              17,2064    23721 1              STOVL   TRANSM1
 00523    REF   1              17,2065    37636 0                      GEORGEC
 00524    REF   2 LAST 476     17,2066    23727 1              STOVL   TRANSM1 +6
 00525    REF   1              17,2067    37644 0                      GEORGEB
 00526    REF   3 LAST 476     17,2070    01735 1              STORE   TRANSM1 +12D
 0053                          17,2071    77776 1              EXIT
 00531    REF   1              17,2072   0 3612 1   JUMPLOAD   TC      LOADGTSM
 0054     REF  59 LAST 475     17,2073   0 4063 0              TC      BANKCALL
 0055     REF   1              17,2074    42000 1              CADR    ESTIMS
 0075     REF   1              17,2075   0 4614 0   TORQUE     TC      PHASCHNG            FILTER TORQUES PLTFM AND SETS UP ERATE
 0076                          17,2076    00000 1              OCT     00000
 0081     REF 167 LAST 475     17,2077   3 7665 0              CA      ZERO
 0082     REF  14 LAST 475     17,2100   54 336 0              TS      DSPTEM2
 0083     REF   2 LAST 376     17,2101   3 1640 1              CA      DRIFTI
 0084     REF  15 LAST 476     17,2102   54 337 1              TS      DSPTEM2 +1
 0085     REF   6 LAST 475     17,2103   51'544 0              INDEX   POSITON
 0086     REF   1              17,2104   55'551 0              TS      SOUTHDR -1
 0087     REF   2 LAST 475     17,2105   0 3576 0              TC      SHOW

 0088     REF  24 LAST 475     17,2106   51'537 1   PIPACHK    INDEX   NDXCTR              TORQUE PLATFORM TO CORRECT  LEVELING ERR
 0089                          17,2107   0 2110 0              TC      +1                  IN PREPARATION TO MEASURING VERTICAL
 0090     REF  60 LAST 476     17,2110   0 4063 0              TC      BANKCALL            PIPA OUTPUT PULSE RATE
 0091     REF   3 LAST 448     17,2111    30422 0              CADR    EARTHR

 0092     REF   1              17,2112   3 3663 1              CA      DEC17                ALLOW PIP COUNTER TO OVERFLOW 17 TIMES
 0093     REF   5 LAST 376     17,2113   55'632 0              TS      DATAPL +4
 0094     REF  39 LAST 447     17,2114   3 7646 1              CA      BIT10               IN THE ALLOTED TIME INTERVAL
 0095     REF   1              17,2115   55'527 1              TS      LENGTHOT
 0096     REF 121 LAST 475     17,2116   3 7657 1              CA      ONE
 0097     REF   1              17,2117   55'673 0              TS      RESULTCT
 0098     REF 168 LAST 476     17,2120   3 7665 0              CA      ZERO                ZERO PIPA COUNTER INITIALLY
 0099     REF   3 LAST 446     17,2121   51'541 0              INDEX   PIPINDEX
 0100     REF   6 LAST 445     17,2122   54 037 1              TS      PIPAX
 0101     REF   6 LAST 476     17,2123   55'626 0              TS      DATAPL
 0102     REF   1              17,2124   3 3675 0              CA      DEC56                LOOP 56 TIMES 5.12 SEC "ACH. EACH INCR.
 0103     REF   1              17,2125   0 3205 0              TC      WAITLOOP            WILL ALSO CORRECT EARTH RATE
 0104                          17,2126   0 0004 0              INHINT
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0105   REF   3 LAST 446    17,2127  0 2771 1           TC       CHECKG
0106                       17,2130  0 0003 1           RELINT
0107   REF   1             17,2131  0 3065 1           TC       DATALD
0108   REF  10 LAST 466    17,2132  3 7664 1           CA       FIVE
0109   REF   2 LAST 476    17,2133  55'673 0           TS       RESULTCT
0110   REF  25 LAST 476    17,2134  51'537 1           INDEX    NDXCTR
0111                       17,2135  0 2136 1           TC       +1
0112   REF  61 LAST 476    17,2136  0 4063 0           TC       BANKCALL
0113   REF   4 LAST 476    17,2137   30422 0           CADR     EARTHR
0114   REF   1             17,2140  11'676 0           CCS      COUNTPL
0115   REF   1             17,2141  0 3227 0           TC       WAITLP2
0116   REF   7 LAST 476    17,2142  11'627 1           CCS      DATAPL +1
0117                       17,2143  0 2147 1           TC       +4
0118   REF  23 LAST 338    17,2144  0 5464 1           TC       CCSHOLE
0119   REF   8 LAST 477    17,2145  4 1632 0           CS       DATAPL +4
0120   REF   9 LAST 477    17,2146  55'632 0           TS       DATAPL +4
0121                       17,2147  0 0006 1           EXTEND
0122   REF  10 LAST 477    17,2150  4 1627 1           DCS      DATAPL
0123   REF  11 LAST 477    17,2151  21'633 1           DAS      DATAPL +4

0124   REF  39 LAST 476    17,2152  0 6000 1           TC       INTPRET
0125                       17,2153   45345 1           DLOAD    DSU
0126   REF  12 LAST 477    17,2154   01635 0                     DATAPL +6
0127   REF  13 LAST 477    17,2155   01631 1                    DATAPL +2
0128                       17,2156   56325 0           PDDL     DDV
0129   REF  14 LAST 477    17,2157   01633 0                    DATAPL +4
0130                       17,2160   41325 0           PDDL     DMP
0131   REF   1             17,2161   37665 0                    DEC585          DEC585 HAS BEEN REDEFINED FOR LEM
0132                       17,2162   77624 1           RTB
0133   REF   3 LAST 454    17,2163   33406 0                    SGNAGREE
0134   REF  16 LAST 476    17,2164   00337 0           STORE    DSPTEM2
0135                       17,2165   77776 1           EXIT
0136   REF   3 LAST 476    17,2166  0 3576 0           TC       SHOW
0137   REF   1             17,2167  3 3656 1 VERTDRFT  CA       3990DEC         NUMBER OF SECONDS TO SPEND ESTIMATING
0138   REF   2 LAST 476    17,2170  55'527 1           TS       LENGTHOT
01381  REF  62 LAST 477    17,2171  0 4063 0           TC       BANKCALL        THIS WILL CORRECT FOR EARTH RATE DURING
01382  REF   5 LAST 477    17,2172   30422 0           CADR     EARTHR          TIME SPENT IN SHOW ABOVE*
01383  REF  13 LAST 461    17,2173  3 0032 0           CA       CDUX            STOORE AXIS  FOR LAB CALC OF DRIFT
01384  REF   1             17,2174  55'530 1           TS       LOSVEC
0139   REF   7 LAST 476    17,2175  51'544 0           INDEX    POSITON
0140   REF   2 LAST 476    17,2176  4 1550 1           CS       SOUTHDR -2
0141   REF   3 LAST 475    17,2177  55'576 0           TS       DRIFTT
014101 REF   2 LAST 476    17,2200  0 3612 1           TC       LOADGTSM
0142   REF 169 LAST 476    17,2201  3 7665 0           CA       ZERO            ALLOW ONLY SOUTH GYRO EARTH RATE COMPENS
0143   REF  22 LAST 475    17,2202  55'400 0           TS       XSM
0144   REF  23 LAST 477    17,2203  55'401 1           TS       XSM +1
0145   REF  24 LAST 477    17,2204  55'404 1           TS       XSM +4
0146   REF  25 LAST 477    17,2205  55'405 0           TS       XSM +5
0147   REF   9 LAST 458    17,2206  55'406 0           TS       YSM
0148   REF  10 LAST 477    17,2207  55'407 1           TS       YSM +1
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0149   REF  11 LAST 477   17,2210  55'412 0            TS     YSM +4
0150   REF  12 LAST 478   17,2211  55'413 1            TS     YSM +5
0151   REF   8 LAST 458   17,2212  55'414 0            TS     ZSM
0152   REF   9 LAST 478   17,2213  55'415 1            TS     ZSM +1
0153   REF  10 LAST 478   17,2214  55'420 1            TS     ZSM +4
0154   REF  11 LAST 478   17,2215  55'421 0            TS     ZSM +5
0155   REF  29 LAST 473   17,2216  3 7637 1  GUESS1    CAF    POSMAX
0156   REF   3 LAST 475   17,2217  55'574 1            TS     TORQNDX
0157   REF   4 LAST 478   17,2220  55'575 0            TS     TORQNDX +1
0158   REF  63 LAST 477   17,2221  0 4063 0            TC     BANKCALL
0159   REF   2 LAST 476   17,2222   42000 1            CADR   ESTIMS
0170   REF   2 LAST 476   17,2223  0 4614 0  VALMIS    TC     PHASCHNG
01701                     17,2224   00000 1            OCT    00000
01702  REF   2 LAST 376   17,2225  3 1636 0            CA     DRIFTO
0171   REF  17 LAST 477   17,2226  54 337 1            TS     DSPTEM2 +1
01711  REF  14 LAST 477   17,2227  3 0032 0            CA     CDUX              STORE OG ANGLE FOR LAB CALC OF DRIFT**
01715  REF   2 LAST 477   17,2230  55'531 0            TS     LOSVEC +1
0172   REF 170 LAST 477   17,2231  3 7665 0            CA     ZERO
0173   REF  18 LAST 478   17,2232  54 336 0            TS     DSPTEM2
0174   REF   4 LAST 477   17,2233  0 3576 0            TC     SHOW


0175   REF 122 LAST 476   17,2234  3 7657 1  FINISH    CA     ONE
0176   REF   8 LAST 477   17,2235  6 1544 0            AD     POSITON
0177   REF  19 LAST 478   17,2236  54 340 1            TS     DSPTEM2 +2
0178   REF  60 LAST 474   17,2237  3 7656 0            CA     TWO
0179   REF  23 LAST 462   17,2240  55'546 0            TS     QPLACE
0180   REF  64 LAST 478   17,2241  0 4063 0            TC     BANKCALL
0181   REF   2 LAST 267   17,2242   22343 0            CADR   TSELECT -6
0182   REF  65 LAST 478   17,2243  0 4063 0  ENDTEST1  TC     BANKCALL
0183   REF  24 LAST 474   17,2244   30745 1            CADR   ENDTEST
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L        IMU PERFORMANCE TESTS 2                                                       USER'S OWN PAGE NO.   5

0184   REF   1              17,2245  3 3666 1  OPCHK     CAF     DELYOFF       AUTOMATIC TEST FOR SYSTEM OPERATION
0185                        17,2246  0 0006 1            EXTEND
0186                        17,2247  02 030 0            RAND    30            CHECK TO SEE IF IMU IS ON
0187   REF 323 LAST 471     17,2250  10 000 0            CCS     A
0188   REF   1              17,2251  0 2440 0            TC      ALARMS
0189   REF   1              17,2252  3 3661 0            CAF     V16N20S
0190   REF  40 LAST 470     17,2253  0 5332 0            TC      NVSBWAIT

0191   REF  11 LAST 460     17,2254  0 5401 1            TC      FREEDSP
0192   REF  66 LAST 478     17,2255  0 4063 0            TC      BANKCALL
0193   REF   4 LAST 475     17,2256   26000 0            CADR    IMUZERO
0194   REF  67 LAST 479     17,2257  0 4063 0            TC      BANKCALL
0195   REF  17 LAST 476     17,2260   26716 0            CADR    IMUSTALL

0196   REF   4 LAST 476     17,2261  1 2243 1            TCF     ENDTEST1
0197   REF  23 LAST 434     17,2262  3 7650 0            CA      BIT8          ZERO ALL ERASEABLE USED IN TEST
0198   REF   2 LAST 451     17,2263  55'776 1            TS      ZERONDX
0199   REF   1              17,2264  3 3671 1            CA      GENPLAD
0200   REF   2 LAST 451     17,2265  0 3236 0            TC      ZEROING
0201   REF   2 LAST 475     17,2266  0 3344 1            TC      NBPOSPL       ALIGN ANGLE COMPUTATION

0202   REF   2 LAST 475     17,2267  0 3077 1            TC      POSGMBL       COARSE ALIGN THOSE GIMBALS NOW

0203   REF   2 LAST 267     17,2270  1 2245 1            TCF     OPCHK
0204   REF   2 LAST 475     17,2271  0 3124 0            TC      FALNE         FINE ALIGN PLATFORM BY TORQUING GYROS

0205   REF  68 LAST 479     17,2272  0 4063 0            TC      BANKCALL
0206   REF  18 LAST 479     17,2273   26716 0            CADR    IMUSTALL
0207   REF   5 LAST 479     17,2274  1 2243 1            TCF     ENDTEST1
0208   REF  51 LAST 478     17,2275  3 7656 0            CA      TWO
0209   REF   2 LAST 474     17,2276  55'672 1  CDUCHECK  TS      CDUNDX        THIS LOOP CHECKS FOR NO ERROR BETWEEN
0210   REF   3 LAST 479     17,2277  51'672 0            INDEX   CDUNDX        DESIRED CDU ANGLES AND THE ACTUAL ANGLES
0211   REF  16 LAST 475     17,2300  4 0400 1            CS      THETAD
0212   REF   4 LAST 479     17,2301  51'672 0            INDEX   CDUNDX
0213   REF  15 LAST 478     17,2302  6 0032 0            AD      CDUX
0214   REF   5 LAST 458     17,2303  55'551 0            TS      STOREPL
0215   REF   6 LAST 479     17,2304  11'551 0            CCS     STOREPL
0216   REF   1              17,2305  0 2313 1            TC      ERRMASK
0217   REF   1              17,2306  0 2310 1            TC      NOERR
0218   REF   2 LAST 479     17,2307  0 2313 1            TC      ERRMASK
0219   REF   5 LAST 479     17,2310  11'672 1  NOERR     CCS     CDUNDX
0220   REF   1              17,2311  0 2276 0            TC      CDUCHECK
0221   REF   1              17,2312  0 2317 0            TC      LOADIC
0222   REF   1              17,2313  7 3674 0  ERRMASK   MASK    LOWFOUR       ALLOW FIVE BIT ERRORS
0223   REF 324 LAST 479     17,2314  10 000 0            CCS     A
0224   REF   2 LAST 479     17,2315  0 2440 0            TC      ALARMS
0225   REF   2 LAST 479     17,2316  0 2310 1            TC      NOERR
0226   REF 123 LAST 478     17,2317  3 7657 1  LOADIC    CA      ONE
0227   REF   3 LAST 477     17,2320  55'673 0            TS      RESULTCT
0228   REF 124 LAST 479     17,2321  4 7657 0            CS      ONE
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L      IMU PERFORMANCE TESTS 2                                                    USER'S OWN PAGE NO.  6

0229   REF   1               17,2322  55'670 0            TS      MASKREG      SETS UP AZIMUTH AND VERTICAL VECTORS FOR

0230   REF 171 LAST 478      17,2323  3 7665 0            CA      ZERO
0231   REF   7 LAST 476      17,2324  54 037 1            TS      PIPAX
0232   REF   4 LAST 445      17,2325  54 040 1            TS      PIPAY
0233   REF   5 LAST 445      17,2326  54 041 0            TS      PIPAZ

0234   REF  27 LAST 377      17,2327  3 7645 1            CA      BIT11
0235   REF   3 LAST 477      17,2330  55'527 1            TS      LENGTHOT       VECTOR IN PIPA COUNTERS
0236   REF 125 LAST 479      17,2331  3 7657 1            CA      ONE
0237   REF   2 LAST 476      17,2332  0 3205 0            TC      WAITLOOP
0238   REF   2 LAST 477      17,2333  11'676 0            CCS     COUNTPL
0239   REF   2 LAST 477      17,2334  0 3227 0            TC      WAITLP2
0240   REF   2 LAST 476      17,2335  3 3675 0            CA      DEC56
0241   REF   3 LAST 480      17,2336  0 3205 0            TC      WAITLOOP
0242   REF  62 LAST 479      17,2337  3 7656 0  OPCHK1    CA      TWO
0243   REF   4 LAST 476      17,2340  55'541 1  OPCHK2    TS      PIPINDEX
0244                         17,2341  0 0004 0            INHINT
0245   REF   4 LAST 477      17,2342  0 2771 1            TC      CHECKG
0246                         17,2343  0 0003 1            RELINT
0247   REF 172 LAST 480      17,2344  3 7665 0            CA      ZERO
0248   REF   5 LAST 480      17,2345  51'541 0            INDEX   PIPINDEX
0249   REF   8 LAST 480      17,2346  54 037 1            TS      PIPAX
0250   REF   2 LAST 477      17,2347  0 3065 1            TC      DATALD       LOAD PIPA DATA AND TIME IN DATAPL
0251   REF   4 LAST 479      17,2350  57'673 1            XCH     RESULTCT
0252   REF  13 LAST 432      17,2351  6 7655 0            AD      FOUR
0253   REF   5 LAST 480      17,2352  55'673 0            TS      RESULTCT
0254   REF   6 LAST 480      17,2353  11'541 1            CCS     PIPINDEX
0255   REF   1               17,2354  0 2340 1            TC      OPCHK2
0256   REF  14 LAST 480      17,2355  4 7655 1  READOUT   CS      FOUR
0257   REF   6 LAST 480      17,2356  6 1673 1            AD      RESULTCT
0258   REF   7 LAST 480      17,2357  55'673 0            TS      RESULTCT
0259                         17,2360  22 007 0            ZL
0260   REF   8 LAST 480      17,2361  51'673 1            INDEX   RESULTCT
0261   REF  15 LAST 477      17,2362  3 1626 1            CA      DATAPL
0262   REF 325 LAST 479      17,2363  22 000 1            LXCH    A
0263   REF   9 LAST 480      17,2364  51'673 1            INDEX   RESULTCT
0264   REF  45 LAST 472      17,2365  21'572 1            DAS     GENPL +1
0265   REF  10 LAST 480      17,2366  3 1673 1            CA      RESULTCT
0266   REF   2 LAST 480      17,2367  7 1670 0            MASK    MASKREG
0267   REF 326 LAST 480      17,2370  10 000 0            CCS     A
0268   REF   1               17,2371  0 2355 0            TC      READOUT
0269   REF   9 LAST 472      17,2372  3 7661 1            CA      TEN
0270   REF  23 LAST 465      17,2373  6 6165 0            AD      THREE
0271   REF  11 LAST 480      17,2374  55'673 0            TS      RESULTCT
0272   REF 327 LAST 480      17,2375  4 0000 0            CS      A
0273   REF   3 LAST 480      17,2376  55'670 0            TS      MASKREG
0274   REF   3 LAST 480      17,2377  11'676 0            CCS     COUNTPL
0275   REF   3 LAST 480      17,2400  0 3227 0            TC      WAITLP2
0276   REF   1               17,2401  0 3250 0            TC      COMPUT
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 0277  REF   1              17,2402  3 3662 0  RADCK     CA      V16N40S
 0278  REF  41 LAST 479     17,2403  0 5332 0            TC      NVSBWAIT       OPERATOR WILL CHECK RADAR STATUS.IN LAB.
 0279  REF  10 LAST 465     17,2404  0 5274 0            TC      FLASHON        SET RADAR OFF THEN PUT RESOLVER STANDARD
 0280  REF  29 LAST 469     17,2405  0 5140 1            TC      ENDIDLE        ON TRUNNION AND SET TO +45 DEG.SHAFT WIL
 0281  REF   6 LAST 479     17,2406  0 2243 0            TC      ENDTEST1
 0282                       17,2407  0 2410 0            TC      +1             AFTER SETTING RES STANDARD DO A V33
 0283  REF 173 LAST 480     17,2410  3 7665 0            CA      ZERO
 0284  REF  19 LAST 422     17,2411  54 424 1            TS      TANG +1
 0285  REF   1              17,2412  3 3676 0            CA      45DEG
 0286  REF  20 LAST 481     17,2413  54 423 0            TS      TANG
 0287  REF  69 LAST 479     17,2414  0 4063 0  DRIVRAD   TC      BANKCALL       IN SC WHEN RAD PRESENT DO V33 RIGHT AWAY
 0288  REF   3 LAST 462     17,2415   20247 1            CADR    RRZERO         LGC WILL ATTEMPT TO DRIVE 45 DEG TRUNN.
 0289  REF  70 LAST 481     17,2416  0 4063 0            TC      BANKCALL       TO MATCH STANDARD, AFTER ZEROING CDUS
 0290  REF   6 LAST 462     17,2417   26712 1            CADR    RADSTALL
 0291  REF   7 LAST 481     17,2420  0 2243 0            TC      ENDTEST1
 0292  REF  40 LAST 477     17,2421  0 6000 1            TC      INTPRET
 0293                       17,2422   77634 0            CALL
 0294  REF   2 LAST 264     17,2423   20363 0                    RRDESNB
 0295  REF  71 LAST 481     17,2424  0 4063 0            TC      BANKCALL
 0296  REF   7 LAST 481     17,2425   26712 1            CADR    RADSTALL       IF CDU FAILS TO AGREE WITH COMMAND TO
 0297  REF   3 LAST 479     17,2426  0 2440 0            TC      ALARMS         1 DEG GET ALARM HERE

 0298  REF  11 LAST 481     17,2427  0 5274 0            TC      FLASHON        OPERATOR WILL CHECK STATUS OF RADAR
 0299  REF  30 LAST 481     17,2430  0 5140 1            TC      ENDIDLE        IN S/C DO V33 TO CONTINUE WITH SHAFT
 0300  REF   8 LAST 481     17,2431  0 2243 0            TC      ENDTEST1       TEST
 0301                       17,2432  0 2433 1            TC      +1             IN LAB TURN RADAR OFF CHANGE RES STANDAR
 0302  REF 174 LAST 481     17,2433  3 7665 0            CA      ZERO           TO SHAFT AND SET FOR -45DEG.
 0303  REF  21 LAST 481     17,2434  54 423 0            TS      TANG           THEN DO A V33 IF WANT TO REPEAT CHECK
 0304  REF   2 LAST 481     17,2435  4 3676 1            CS      45DEG          DO A V34 TO TERMINATE
 0305  REF  22 LAST 481     17,2436  54 424 1            TS      TANG +1
 0306  REF   1              17,2437  0 2414 1            TC      DRIVRAD
 0307  REF 273 LAST 473     17,2440  56 002 0  ALARMS    XCH     Q
 0308  REF  24 LAST 478     17,2441  55 546 0            TS      QPLACE
 0309  REF  29 LAST 462     17,2442  0 5413 1            TC      ALARM
 0310                       17,2443   01411 1            OCT     1411
 0311  REF  25 LAST 481     17,2444  0 1546 1            TC      QPLACE
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L        IMU PERFORMANCE TESTS 2                                                              USER'S OWN PAGE NO.   8

0312     REF  41 LAST 481     17,2445  0 6000 1  GYRSFTST TC      INTPRET       START ADRESS FOR IRIG SF TEST
0313                          17,2446   77634 0           CALL
0314     REF   3 LAST 475     17,2447   30530 1                   LATAZCHK      LOAD AZ AND LAT
0315                          17,2450   77776 1           EXIT
0316     REF   1              17,2451  3 3651 0  TESTCALL CAF     V21N30E
0317     REF  42 LAST 481     17,2452  0 5332 0           TC      NVSBWAIT      LOAD + OR - 1 FOR + OR - X TEST (+00001)
0318     REF  31 LAST 481     17,2453  0 5140 1           TC      ENDIDLE       LOAD + OR - 2 FOR + OR - Y TEST
0319     REF   9 LAST 481     17,2454  1 2243 1           TCF     ENDTEST1      LOAD + OR - 3 FOR + OR - Z TEST
0320     REF   1              17,2455  0 2451 0           TC      TESTCALL
0321     REF  45 LAST 467     17,2456  56 333 1           XCH     DSPTEM1
0322     REF   1              17,2457  55'614 1           TS      CALCDIR
03221                         17,2460  0 0006 1           EXTEND                THIS ROUTINE LOOKS AT THE SIZE OF THE
03222    REF   1              17,2461  6 2466 1           BZMF    NEGSIZ        ENTRY MADE BY THE OPERATOR, IF HE DID NO
03223    REF   3 LAST 377     17,2462  7 7671 1  SIZLOOK  MASK    NEG3          T ENTER TEST NO THAT IS W/I PERMISSIBLE
03224                         17,2463  0 0006 1           EXTEND                RANGE- HE WILL BE ASKED TO LOAD AGAIN.
03225    REF   1              17,2464  1 2470 1           BZF     GUDENTRY        THIS IS CONSIDERED NECESSARY BECAUSE
03226    REF   2 LAST 482     17,2465  0 2451 0           TC      TESTCALL      OF FOLLOWING INDEXED TC WHICH COULD

03227                         17,2466  4 0000 0  NEGSIZ   COM                   SEND THE COMPUTER OFF INTO THE BOONDOCKS
03228    REF   1              17,2467  0 2462 0           TC      SIZLOOK       TO PLAY WITH ITSELF IF THE OPERATOR
03229    REF   2 LAST 482     17,2470  3 1614 0  GUDENTRY CA      CALCDIR       MAKES ABAD ENTRY******
0323     REF  15 LAST 480     17,2471  6 7655 0           AD      FOUR
0324     REF 328 LAST 480     17,2472  50 000 1           INDEX   A
0325                          17,2473  0 2474 1           TC      +1
0326     REF   3 LAST 482     17,2474  0 2451 0           TC      TESTCALL
0327                          17,2475  0 2503 0           TC      +6            C(A)=+00001 FOR -Z
0328                          17,2476  0 2502 1           TC      +4            C(A)=+00002 FOR -Y
0329                          17,2477  0 2501 1           TC      +2            C(A)=+00003 FOR -X
0330                          17,2500  0 2474 1           TC      -4            C(A)=+00004   ERROR
0331                          17,2501  0 2504 1           TC      +3            C(A)=+00005 FOR +X
0332                          17,2502  0 2510 1           TC      +6
0333                          17,2503  0 2513 1           TC      +10
0334     REF  16 LAST 482     17,2504  3 7655 0           CAF     FOUR
0335     REF   9 LAST 478     17,2505  55'544 1           TS      POSITON        4 IS FOR A.L. POSN 4 USED FOR X SF TEST
0336                          17,2506  0 2515 1           TC      +7
0337                          17,2507  0 2515 1           TC      +6
0338     REF  63 LAST 480     17,2510  3 7656 0           CAF     TWO
0339     REF  10 LAST 482     17,2511  55'544 1           TS      POSITON       +2 IS A.L. POS 2 USED FOR Y SF TEST
0340                          17,2512  0 2515 1           TC      +3
0341     REF 126 LAST 480     17,2513  3 7657 1           CAF     ONE
0342     REF  11 LAST 482     17,2514  55'544 1           TS      POSITON       +1 IS A.L. POS 1 USED FOR Z SF TEST
0343     REF   2 LAST 474     17,2515  55'617 1           TS      OPTNREG       C(K) = (4,2,1) FOR X,Y,Z
0344     REF   1              17,2516  55'621 1           TS      SAVE +1
0345     REF  12 LAST 479     17,2517  0 5401 1           TC      FREEDSP
0346     REF 175 LAST 481     17,2520  3 7665 0           CAF     ZERO
0347     REF   1              17,2521  55'536 1           TS      NBPOS         SET UP NB COORD TO Z NORTH, X UP
0348     REF   2 LAST 482     17,2522  55'622 1           TS      SAVE +2       INITIALIZE FOR EARTHR DESIGNATE USAGE
0349     REF   1              17,2523  55'563 1           TS      TESTNO        INITIALIZE FOR TEST ABORT ROUTINE
0350     REF   1              17,2524  55'615 0           TS      CDUFLAG       ZEROS FOR STRTWACH USE
0351     REF   1              17,2525  3 3653 1           CAF     SFCONST
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L          IMU PERFORMANCE TESTS 2                                                         USER'S OWN PAGE NO.   9

 0352   REF   1                17,2526  55'623 0            TS        SFCONST1        FOR DIVISION DURING CALCSFE

 0353   REF  72 LAST 481       17,2527  0 4063 0            TC        BANKCALL
 0354   REF   5 LAST 479       17,2530   26000 0            CADR      IMUZERO
 0355   REF  73 LAST 483       17,2531  0 4063 0            TC        BANKCALL
 0356   REF  19 LAST 479       17,2532   26716 0            CADR      IMUSTALL
 0357   REF  10 LAST 482       17,2533  1 2243 1            TCF       ENDTEST1
 0358   REF   3 LAST 479       17,2534  0 3344 1            TC        NBPOSPL
 0359   REF   3 LAST 479       17,2535  0 3077 1            TC        POSGMBL
 0360   REF  11 LAST 483       17,2536  1 2243 1            TCF       ENDTEST1
 0361   REF   3 LAST 479       17,2537  0 3124 0            TC        FALNE
 0362   REF  74 LAST 483       17,2540  0 4063 0            TC        BANKCALL
 0363   REF   1                17,2541   31703 1            CADR      REDYTORK
 0364   REF   3 LAST 477       17,2542  55'552 0  WAITFIVE  TS        SOUTHDR
 0365   REF  32 LAST 468       17,2543  3 7652 1            CAF       BIT6           THIS SECTION CALLS FOR 2-32 MSEC WAITS
 0366   REF   1                17,2544  0 2557 1            TC        DIRECTN -5
 0367   REF  33 LAST 483       17,2545  3 7652 1  ENABLE    CAF       BIT6
 0368                          17,2546  0 0006 1            EXTEND                   ENABLE GYRO TORQUING LOOP BY TURNING
 0369   REF   1                17,2547  05 014 1            WOR       14C            ON CAL MODULE RELAY

 0370                          17,2550  0 0004 0            INHINT
 0371   REF  64 LAST 482       17,2551  4 7656 1            CS        TWO            SETS UP EXEC SWITCH SO IMUPULSE WILL
 0372   REF  16 LAST 364       17,2552  7 0370 1            MASK      IMODES33       NOT TURN OFF GYRO TORQ ENABLE RELAY
 0373   REF  65 LAST 483       17,2553  6 7656 0            AD        TWO
 0374   REF  17 LAST 483       17,2554  54 370 1            TS        IMODES33
 0375   REF  66 LAST 483       17,2555  3 7656 0            CAF       TWO
 0376   REF   4 LAST 483       17,2556  55'552 0            TS        SOUTHDR
 0377   REF   4 LAST 480       17,2557  55'527 1            TS        LENGTHOT        20 MSEC DELAY FOR GYRO LOOP STABILIZAT.
 0378   REF 127 LAST 482       17,2560  3 7657 1            CA        ONE
 0379   REF   4 LAST 480       17,2561  0 3205 0            TC        WAITLOOP
 0380   REF   4 LAST 480       17,2562  11'676 0            CCS       COUNTPL
 0381   REF   4 LAST 480       17,2563  0 3227 0            TC        WAITLP2
 0382   REF  75 LAST 483       17,2564  0 4063 0  DIRECTN   TC        BANKCALL        TORQUING ROUTINE IN IMU PERFORMANCE
 0383   REF   1                17,2565   34520 1            CADR      SILVER            BANK 3
 0384   REF   5 LAST 483       17,2566  11'552 0            CCS       SOUTHDR        A ONE FIRST TIME THROUGH, THEN ZERO
 0385   REF   1                17,2567  0 2542 0            TC        WAITFIVE

 0386   REF   2 LAST 482       17,2570  11'615 0  STRTWACH  CCS       CDUFLAG         RETURNS HERE VIA QPLACE FROM SILVER
 0387   REF   1                17,2571  0 2652 1            TC        CDUZOTST       BEEN CAUGHT AND CDU THROUGH ZERO IS
 0388   REF   3 LAST 482       17,2572  11'621 1            CCS       SAVE +1
 0389   REF   1                17,2573  0 2612 0            TC        LOOKCDUP -4
 0390   REF   2 LAST 483       17,2574  0 2616 1            TC        LOOKCDUP
 0391   REF 176 LAST 482       17,2575  3 7665 0  CORRECT   CAF       ZERO
 0392   REF  10 LAST 203       17,2576  54 357 1            TS        LGYRO           RELEASES GYROS FOR IMUPULSE USAGE
 0393   REF  76 LAST 483       17,2577  0 4063 0            TC        BANKCALL       EARTHRATE CORRECTION TO GYROS NOT EAST
 0394   REF   6 LAST 477       17,2600   30422 0            CADR      EARTHR         OR WEST
 0395   REF 128 LAST 483       17,2601  3 7657 1            CAF       ONE
 0396   REF  11 LAST 483       17,2602  54 357 1            TS        LGYRO          RESERVES GYROS FOR S.F. TEST TORQUING
 0397   REF   4 LAST 483       17,2603  55'622 1            TS        SAVE +2        INITIALIZES TO INSURE 5.6 DEG OF TORQ)
 0398   REF   2 LAST 482       17,2604  27'563 1            ADS       TESTNO         INCR THE BURST COUNTER, WHICH IS USED TO
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L        IMU PERFORMANCE TESTS 2                                                              USER'S OWN PAGE NO.  10

 0399   REF   3 LAST 483    17,2605  4 1563 1            CS      TESTNO         COUNT THE NO. OF TIMES THE GYRO COUNTER
 0400   REF  11 LAST 477    17,2606  7 7664 0            MASK    FIVE           IS LOADED. IF A TENTH LOAD IS REQUESTED
 0401                       17,2607  0 0006 1            EXTEND                 THE SFE IS TOO LARGE TO BE MEANINGFULL
 0402   REF   1             17,2610  1 2760 0            BZF     STOPTEST       OR THE CDU,S ARE NOT WORKING.
 0403   REF   2 LAST 483    17,2611  0 2564 1            TC      DIRECTN

 0404   REF 177 LAST 483    17,2612  3 7665 0            CAF     ZERO           ZEROS CDU REG WHICH WILL BE USED TO
 0405   REF   5 LAST 483    17,2613  55'621 1            TS      SAVE +1
 0406   REF   6 LAST 479    17,2614  51'672 0            INDEX   CDUNDX         MEASURE ANGLE.
 0407   REF  16 LAST 479    17,2615  54 032 1            TS      CDUX
 0408                       17,2616  0 0004 0   LOOKCDUP INHINT
 0409   REF  16 LAST 461    17,2617  3 7653 0            CAF     BIT5
 0410   REF   1             17,2620  55'624 1   STILLOOK TS      TIMER
 0411   REF   7 LAST 484    17,2621  51'672 0            INDEX   CDUNDX         LOOKS FOR FIRST CDU PULSE AFTER TORQUING
 0412   REF  17 LAST 484    17,2622  10 032 1            CCS     CDUX           STARTS
 0413   REF   1             17,2623  0 2635 0            TC      OUTPLUS        HERE IS PLUS PULSE
 0414   REF   1             17,2624  0 2627 0            TC      TIMEWACH
 0415   REF   4 LAST 481    17,2625  0 2440 0            TC      ALARMS         TTELL OPERATOR FIRST CDU PULSE WAS MISSD
 0416   REF   1             17,2626  0 2646 1            TC      OUTNEG         HERE IS MINUS PULSE
 0417   REF   2 LAST 484    17,2627  11'624 1   TIMEWACH CCS     TIMER          WATCHES TIME IN INHINT SO COPS WILL NOT
 0418   REF   1             17,2630  0 2620 1            TC      STILLOOK       CATCH US
 0419                       17,2631  0 0003 1            RELINT

 0420   REF  19 LAST 395    17,2632  10 067 1            CCS     NEWJOB
 0421   REF   4 LAST 395    17,2633  0 4404 0            TC      CHANG1
 0422   REF   3 LAST 483    17,2634  0 2616 1            TC      LOOKCDUP       KEEP WATCHING IF THE PULSE IS NOT HERE

 0423   REF   1             17,2635  4 3652 1   OUTPLUS  CS      DESANGLE       -2047 CDU PULSES ADDED TO CDU REG SO
 0424   REF   8 LAST 484    17,2636  51'672 0            INDEX   CDUNDX         ZERO CROSSOVER CAN BE DETECTED
 0425   REF  18 LAST 484    17,2637  54 032 1            TS      CDUX
 0426   REF 129 LAST 483    17,2640  3 7657 1   LOADFLAG CAF     ONE
 0427   REF   3 LAST 483    17,2641  55'615 0            TS      CDUFLAG
 0428   REF   1             17,2642  3 0047 1            CA      GYROCTR        GYRO TORQ CMDS LEFT OUT OF FIRST 5.625
 0429   REF   6 LAST 484    17,2643  55'620 0            TS      SAVE           DEG COMMANDED WHEN CDU PULSE ARRIVED
 0430                       17,2644  0 0003 1            RELINT
 0431   REF   2 LAST 483    17,2645  0 2652 1            TC      CDUZOTST

 0432   REF   2 LAST 484    17,2646  3 3652 0   OUTNEG   CA      DESANGLE
 0433   REF   9 LAST 484    17,2647  51'672 0            INDEX   CDUNDX
 0434   REF  19 LAST 484    17,2650  54 032 1            TS      CDUX
 0435   REF   1             17,2651  0 2640 1            TC      LOADFLAG

 0436   REF  10 LAST 484    17,2652  51'672 0   CDUZOTST INDEX   CDUNDX
 0437   REF  20 LAST 484    17,2653  10 032 1            CCS     CDUX
 0438                       17,2654  0 2660 0            TC      +4
 0439   REF   1             17,2655  0 2675 1            TC      ENDWATCH
 0440                       17,2656  0 2660 0            TC      +2
 0441   REF   2 LAST 484    17,2657  0 2675 1            TC      ENDWATCH
 0442   REF  40 LAST 476    17,2660  3 7646 1            CAF     BIT10          RAND WITH BIT 10 TO SEE IF STILL TORQ.
 0443                       17,2661  0 0006 1            EXTEND
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L      IMU PERFORMANCE TESTS 2                                                 USER'S OWN PAGE NO. 11

0444   REF   2 LAST 483  17,2662  02 014 0            RAND   14C
0445   REF 329 LAST 482  17,2663  10 000 0            CCS    A
0446                     17,2664  0 2672 0            TC     +6

0447   REF   7 LAST 484  17,2665  11'622 1            CCS    SAVE +2     SEE IF 2.8DEG OR 5.6 DEG SINCE LAST
0448                     17,2666  0 2670 1            TC     +2         EEARTHR USE, IF 2.8 DEG, DO 2.8 MORE
0449   REF   1           17,2667  0 2575 1            TC     CORRECT      THEN GO TO CORRECT
0450   REF   8 LAST 485  17,2670  55'622 1            TS     SAVE +2
0451   REF   3 LAST 484  17,2671  0 2564 1            TC     DIRECTN
0452   REF  20 LAST 484  17,2672  10 067 1            CCS    NEWJOB
0453   REF   5 LAST 484  17,2673  0 4404 0            TC     CHANG1
0454   REF   3 LAST 484  17,2674  0 2652 1            TC     CDUZOTST

0455                     17,2675  0 0004 0  ENDWATCH  INHINT            WWILL STOR GYROCTR AT END OF 2048 CDU
0456   REF 178 LAST 484  17,2676  3 7665 0            CAF    ZERO       PULSES AND STOP TORQ BY ZEROING REQUESTS
0457   REF  12 LAST 483  17,2677  54 357 1            TS     LGYRO       RELEASE GYROS FOR OTHERS USAGE
0458   REF   2 LAST 484  17,2700  56 047 1            XCH    GYROCTR
0459   REF   9 LAST 485  17,2701  55'621 1            TS     SAVE +1    AND STOPS TORQUING BY ZEROING TORQ
0460   REF  67 LAST 483  17,2702  4 7656 1            CS     TWO
0461   REF  18 LAST 483  17,2703  7 0370 1            MASK   IMODES33   THIS TURNS OFF EXEC SWITCH SO THE GYRO
0462   REF  19 LAST 485  17,2704  54 370 1            TS     IMODES33   TORQ. ENABLE RELAY CAN BE TURNED OFF.
0463                     17,2705  0 0003 1            RELINT
0464   REF  10 LAST 485  17,2706  3 1620 1  CALCSFE   CA     SAVE       GYROCTR AT TEST START
0465                     17,2707  0 0006 1            EXTEND
0466   REF  11 LAST 485  17,2710  61'621 0            SU     SAVE +1    GYROCTR AT TEST END
0467   REF  12 LAST 485  17,2711  55'622 1            TS     SAVE +2
0468                     17,2712  0 0006 1            EXTEND
0469   REF   1           17,2713  6 2732 0            BZMF   ARITH      SEE IF IT IS NEG OR ZERO,IF NEG,SFE IS +
0470   REF   1           17,2714  7 3654 1            MASK   SIZCHK
0471                     17,2715  0 0006 1            EXTEND            THIS ROUTINE TESTS SAVE-(SAVE+1) TO SEE
0472   REF   1           17,2716  1 2724 0            BZF    NEGSFE     IF THE RESULT IS WITHIN PERMISSIBLE SIZE
0473   REF  13 LAST 485  17,2717  4 1622 1            CS     SAVE +2    AND DETERMINES POLARITY OF SFE USING THE
0474   REF   2 LAST 485  17,2720  7 3654 1            MASK   SIZCHK     PRESENCE OR ABSENCE OF BITS 12,13,14.
0475                     17,2721  0 0006 1            EXTEND            IF BITS ARE PRESENT IN POSITIVE SAVE +2
0476   REF   1           17,2722  1 2726 1            BZF    POSSFE     THEN THE SFE MUST BE POS. IF DIFFERENCE
0477   REF   2 LAST 484  17,2723  0 2760 1            TC     STOPTEST   IS GREATER THAN 2047 PULSES FROM THE
0478   REF  14 LAST 485  17,2724  31'622 0  NEGSFE    CAE    SAVE +2    IDEAL NO OF PULSES, THE SFE EXCEEDS
0479   REF   2 LAST 485  17,2725  0 2732 0            TC     ARITH      15600 PPM, THE TEST IS NOT VALID AND

R0480  THEREFORE ABORTS AND TURNS ON PROGRAM ALARM
0481   REF  30 LAST 478  17,2726  3 7637 1  POSSFE    CAF    POSMAX     POS SFE DEFINITION = IRIG SF IN SEC OF
0482                     17,2727  0 0006 1            EXTEND            ARC PER PULSE IS GREATER THAN
0483   REF  15 LAST 485  17,2730  61'622 0            SU     SAVE +2    .61798095703125  SEC OF ARC/ PULSE
0484   REF   3 LAST 485  17,2731  0 2733 1            TC     ARITH +1

0485                     17,2732  4 0000 0  ARITH     COM
0486                     17,2733  22 007 0            ZL
0487                     17,2734  0 0006 1            EXTEND
0488   REF   2 LAST 483  17,2735  11'623 0            DV     SFCONST1
0489   REF  20 LAST 478  17,2736  54 336 0  LOADIT    TS     DSPTEM2
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0490    REF   1             17,2737   0 2740 0           TC       DATADSP

0491    REF   2 LAST 394    17,2740   0 5304 0  DATADSP  TC       GRABDSP
0492    REF   3 LAST 394    17,2741   0 5312 1           TC       PREGBSY
0493    REF   3 LAST 482    17,2742   3 1614 0           CA       CALCDIR
0494    REF  21 LAST 485    17,2743  54 340  1           TS       DSPTEM2 +2        DISPLAYS TEST NO JUST PERFORMED
0495    REF   1             17,2744   3 3657 0           CAF      VB06N66            R3 = TEST NO JUST PERFORMED
0496    REF  43 LAST 482    17,2745   0 5332 0           TC       NVSBWAIT
0497    REF  12 LAST 481    17,2746   0 5274 0           TC       FLASHON
0498    REF  32 LAST 482    17,2747   0 5140 1           TC       ENDIDLE           TO END TEST DO V34E
0499                        17,2750   0 2752 0           TC       +2
0500    REF   4 LAST 482    17,2751   0 2451 0           TC       TESTCALL          TO CONTINUE TEST DO V33E
0501    REF  77 LAST 483    17,2752   0 4063 0           TC       BANKCALL
0502    REF   6 LAST 483    17,2753    26000 0           CADR     IMUZERO
0503    REF  78 LAST 486    17,2754   0 4063 0           TC       BANKCALL
0504    REF  20 LAST 483    17,2755    26716 0           CADR     IMUSTALL
0505    REF  12 LAST 483    17,2756   1 2243 1           TCF      ENDTEST1
0506    REF  13 LAST 486    17,2757   1 2243 1           TCF      ENDTEST1

0507    REF  79 LAST 486    17,2760   0 4063 0  STOPTEST TC       BANKCALL
0508    REF   7 LAST 486    17,2761    26000 0           CADR     IMUZERO
0509    REF  60 LAST 486    17,2762   0 4063 0           TC       BANKCALL          CORRECT CDUCTRS AND TURN ON PROG ALARM
0510    REF  21 LAST 486    17,2763    26716 0           CADR     IMUSTALL          TO TELL OPERATOR LAST CDU PULSE WAS
0511    REF  14 LAST 486    17,2764   1 2243 1           TCF      ENDTEST1          MISSED OR GYRO TORQ LOOP WAY OUT OF
0512    REF 179 LAST 485    17,2765   3 7665 0           CAF      ZERO              ALLOWABLE LIMITS.........
05122   REF  13 LAST 485    17,2766  54 357  1           TS       LGYRO             **** RELEASE GYROS FOR OTHERS USAGE*****
05126   REF   5 LAST 484    17,2767   0 2440 0           TC       ALARMS
0513    REF  15 LAST 486    17,2770   1 2243 1           TCF      ENDTEST1
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L        IMU PERFORMANCE TESTS 2                                                               USER'S OWN PAGE NO.  13

 0514                            17,2771  0 0006 1  CHECKG     EXTEND                          PIP PULSE CATCHING ROUTINE
 0515   REF  26 LAST 481         17,2772  23'546 1             QXCH    QPLACE                  RECORDS TIME AT OCCURRENCE OF A DELTA V
 0516                            17,2773  0 0003 1  CHECKG1    RELINT                          KEEPS CONTENT OF PIPA REG INTACT
 0517   REF  21 LAST 485         17,2774  10 067 1             CCS     NEWJOB
 0518   REF   6 LAST 485         17,2775  0 4404 0             TC      CHANG1
 0519                            17,2776  0 0004 0             INHINT
 0520   REF 180 LAST 486         17,2777  3 7665 0             CAF     ZERO
 0521   REF   7 LAST 480         17,3000  51'541 0             INDEX   PIPINDEX
 0522   REF   9 LAST 480         17,3001  56 037 0             XCH     PIPAX
 0523   REF   7 LAST 479         17,3002  55'551 0             TS      STOREPL
 0524   REF   8 LAST 487         17,3003  11'551 0             CCS     STOREPL
 0525   REF   1                  17,3004  0 3010 0             TC      CHECKP
 0526   REF   1                  17,3005  0 3063 1             TC      RESTOREA
 0527   REF   1                  17,3006  0 3023 0             TC      CHECKM
 0528   REF   2 LAST 487         17,3007  0 3063 1             TC      RESTOREA
 0529   REF  34 LAST 483         17,3010  3 7652 1  CHECKP     CAF     BIT6                    LOOKS FOR ONE MORE PLUS PULSE
 0530   REF   1                  17,3011  55'540 0             TS      PIPANO
 0531   REF   8 LAST 487         17,3012  51'541 0             INDEX   PIPINDEX
 0532   REF  10 LAST 487         17,3013  10 037 1             CCS     PIPAX
 0533   REF   1                  17,3014  0 3036 1             TC      CHECKG3
 0534                            17,3015  0 3020 0             TC      +3
 0535   REF   3 LAST 487         17,3016  0 3063 1             TC      RESTOREA
 0536                            17,3017  0 3020 0             TC      +1
 0537   REF   2 LAST 487         17,3020  11'540 0             CCS     PIPANO
 0538   REF   2 LAST 487         17,3021  0 3011 1             TC      CHECKP +1
 0539   REF   4 LAST 487         17,3022  0 3063 1             TC      RESTOREA
 0540   REF  35 LAST 487         17,3023  3 7652 1  CHECKM     CAF     BIT6                    LOOKS FOR ONE MORE MINUS PULSE
 0541   REF   3 LAST 487         17,3024  55'540 0             TS      PIPANO
 0542   REF   9 LAST 487         17,3025  51'541 0             INDEX   PIPINDEX
 0543   REF  11 LAST 487         17,3026  10 037 1             CCS     PIPAX
 0544   REF   5 LAST 487         17,3027  0 3063 1             TC      RESTOREA
 0545                            17,3030  0 3033 1             TC      +3
 0546   REF   2 LAST 487         17,3031  0 3036 1             TC      CHECKG3
 0547                            17,3032  0 3033 1             TC      +1
 0548   REF   4 LAST 487         17,3033  11'540 0             CCS     PIPANO
 0549   REF   2 LAST 487         17,3034  0 3024 1             TC      CHECKM +1
 0550   REF   6 LAST 487         17,3035  0 3063 1             TC      RESTOREA
 0551   REF   5 LAST 473         17,3036  0 5470 1  CHECKG3    TC      FINETIME                TIME IN DOUBLE PRECISION LEFT IN MPAC

 0552   REF 568 LAST 470         17,3037  52 141 1             DXCH    MPAC
 0553   REF  28 LAST 469         17,3040  3 7654 1             CAF     BIT4
 0554   REF   5 LAST 487         17,3041  55'540 0  CHECKG5    TS      PIPANO
 0555   REF  10 LAST 487         17,3042  51'541 0             INDEX   PIPINDEX
 0556   REF  12 LAST 487         17,3043  10 037 1             CCS     PIPAX
 0557                            17,3044  0 3050 1             TC      +4
 0558   REF   7 LAST 487         17,3045  0 3063 1             TC      RESTOREA
 0559                            17,3046  0 3050 1             TC      +2
 0560   REF   8 LAST 487         17,3047  0 3063 1             TC      RESTOREA
 0561   REF   6 LAST 487         17,3050  11'540 0             CCS     PIPANO
 0562   REF   1                  17,3051  0 3041 1             TC      CHECKG5
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0563   REF   1            17,3052  0 3055 1  NREAD    TC      RESTORE
0564   REF   9 LAST 487   17,3053  55'551 0           TS      STOREPL
0565   REF  27 LAST 487   17,3054  0 1546 1           TC      QPLACE
0566   REF  10 LAST 488   17,3055  57'551 1  RESTORE  XCH     STOREPL      A WILL CONTAIN PREVIOUS PIPA CNTR CONTEN
0567   REF  11 LAST 487   17,3056  51'541 0           INDEX   PIPINDEX     STOREPL WILL CONTAIN ZERO
0568   REF  13 LAST 487   17,3057  6 0037 0           AD      PIPAX
0569   REF  12 LAST 488   17,3060  51'541 0           INDEX   PIPINDEX
0570   REF  14 LAST 488   17,3061  54 037 1           TS      PIPAX
0571   REF 274 LAST 481   17,3062  0 0002 0           TC      Q
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 0572    REF   2 LAST 488      17,3063  0 3055 1  RESTOREA TC      RESTORE
 0573    REF   1               17,3064  0 2773 0           TC      CHECKG1
 0574    REF  11 LAST 488      17,3065  3 1551 1  DATALD   CA      STOREPL
 0575    REF  12 LAST 480      17,3066  51'673 1           INDEX   RESULTCT
 0576    REF  16 LAST 480      17,3067  55'626 0           TS      DATAPL
 0577    REF 569 LAST 487      17,3070  3 0140 1           CA      MPAC
 0578    REF  13 LAST 489      17,3071  51'673 1           INDEX   RESULTCT
 0579    REF  17 LAST 489      17,3072  55'627 1           TS      DATAPL +1
 0580    REF 570 LAST 489      17,3073  3 0141 0           CA      MPAC +1
 0581    REF  14 LAST 489      17,3074  51'673 1           INDEX   RESULTCT
 0582    REF  18 LAST 489      17,3075  55'630 1           TS      DATAPL +2
 0583    REF 275 LAST 488      17,3076  0 0002 0           TC      Q



 0584                          17,3077  0 0006 1  POSGMBL  EXTEND                  COARSE ALIGNING SUBROUTINE
 0585    REF  28 LAST 488      17,3100  23'546 1           QXCH    QPLACE

 0586    REF  42 LAST 482      17,3101  0 6000 1           TC      INTPRET
 0587                          17,3102   77634 0           CALL
 0588    REF   2 LAST 449      17,3103   32615 1                   CALCGA
 0589                          17,3104   77776 1           EXIT

 0590    REF  81 LAST 486      17,3105  0 4063 0           TC      BANKCALL
 0591    REF   4 LAST 475      17,3106   26055 0           CADR    IMUCOARS
 0592    REF   1               17,3107  3 3123 1           CA      GMLOCKCK        IF FAILREG CONTAINS 401 WILL RETURN TO
 0593    REF   9 LAST 367      17,3110  7 1363 1           MASK    FAILREG
 0594    REF 330 LAST 485      17,3111  10 000 0           CCS     A               L +1, OTHERWISE TO L +2.
 0595    REF   1               17,3112  0 3115 1           TC      LOCK
 0596    REF  29 LAST 489      17,3113  25'546 1           INCR    QPLACE
 0597                          17,3114  0 3117 0           TC      +3
 0598    REF  68 LAST 485      17,3115  3 7656 0  LOCK     CA      TWO
 0599    REF  26 LAST 477      17,3116  55'537 0           TS      NDXCTR
 0600    REF  82 LAST 489      17,3117  0 4063 0           TC      BANKCALL
 0601    REF  22 LAST 486      17,3120   26716 0           CADR    IMUSTALL
 0602    REF  16 LAST 486      17,3121  1 2243 1           TCF     ENDTEST1
 0603    REF  30 LAST 489      17,3122  0 1546 1           TC      QPLACE
 0604                          17,3123   00401 1  GMLOCKCK OCT     00401
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L        IMU PERFORMANCE TESTS 2                                                      USER'S OWN PAGE NO. 16

 0606                           17,3124  0 0006 1  FALNE     EXTEND             TORQUES GYROS TO NULL OVT DIFFERENCE
 0607  REF  31 LAST 489         17,3125  23'546 1            QXCH    QPLACE     BETWEEN DESIRED SM ORIENTATION WITH RESP
 0608  REF  83 LAST 489         17,3126  0 4063 0            TC      BANKCALL   TO NBASE AND ACTUAL
 0609  REF   8 LAST 486         17,3127   26000 0            CADR    IMUZERO
 0610  REF  84 LAST 490         17,3130  0 4063 0            TC      BANKCALL
 0611  REF  23 LAST 489         17,3131   26716 0            CADR    IMUSTALL
 0612  REF  17 LAST 489         17,3132  1 2243 1            TCF     ENDTEST1
 0613  REF  85 LAST 490         17,3133  0 4063 0            TC      BANKCALL
 0614  REF   4 LAST 460         17,3134   26227 1            CADR    IMUFINE
 0615  REF  86 LAST 490         17,3135  0 4063 0            TC      BANKCALL
 0616  REF  24 LAST 490         17,3136   26716 0            CADR    IMUSTALL
 0617  REF  18 LAST 490         17,3137  1 2243 1            TCF     ENDTEST1
 0618  REF  21 LAST 484         17,3140  3 0032 0  FALNE1    CA      CDUX
 0619  REF  32 LAST 470         17,3141  50 104 1            INDEX   FIXLOC
 0620                           17,3142  54 024 0            TS      24
 0621  REF   6 LAST 461         17,3143  3 0033 1            CA      CDUY
 0622  REF  33 LAST 490         17,3144  50 104 1            INDEX   FIXLOC
 0623                           17,3145  54 020 1            TS      20
 0624  REF  11 LAST 461         17,3146  3 0034 0            CA      CDUZ
 0625  REF  34 LAST 490         17,3147  50 104 1            INDEX   FIXLOC
 0626                           17,3150  54 022 0            TS      22
 0627  REF  17 LAST 484         17,3151  3 7653 0            CA      BIT5
 0628  REF  35 LAST 490         17,3152  6 0104 1            AD      FIXLOC
 0629  REF  36 LAST 490         17,3153  50 104 1            INDEX   FIXLOC
 0630  REF  14 LAST 461         17,3154  54 050 0            TS      S1
 0631  REF  43 LAST 489         17,3155  0 6000 1            TC      INTPRET
 0632                           17,3156   64375 1            VLOAD   MXV
 0633  REF  26 LAST 477         17,3157   01401 0                    XSM
 0634  REF  36 LAST 460         17,3160   01445 0                    STARAD
 0635                           17,3161   77772 0            VSL1
 0636                           17,3162   36041 1            STCALL  32D
 0637  REF   7 LAST 449         17,3163   32517 0                    NBSM
 0638  REF  15 LAST 449         17,3164   23423 0            STOVL   XDC
 0639  REF  13 LAST 478         17,3165   01407 0                    YSM
 0640                           17,3166   76521 0            MXV     VSL1
 0641  REF  37 LAST 490         17,3167   01445 0                    STARAD
 0642                           17,3170   36041 1            STCALL  32D
 0643  REF   8 LAST 490         17,3171   32517 0                    NBSM
 0644  REF   5 LAST 449         17,3172   23431 0            STOVL   YDC
 0645  REF  16 LAST 490         17,3173   01423 0                    XDC
 0646                           17,3174   76435 1            VXV     VSL1
 0647  REF   6 LAST 490         17,3175   01431 0                    YDC
 0648  REF   4 LAST 449         17,3176   37437 0            STCALL  ZDC
 0649  REF   2 LAST 449         17,3177   32367 1                    CALCGTA
 0650                           17,3200   77776 1            EXIT
 0651  REF   1                  17,3201  3 3673 0            CA      OGCPL
 0652  REF  87 LAST 490         17,3202  0 4063 0            TC      BANKCALL
 0653  REF   4 LAST 429         17,3203   26317 0            CADR    IMUPULSE
 0654  REF  32 LAST 490         17,3204  0 1546 1            TC      QPLACE
 0655                          17,3205  0 0006 1  WAITLOOP EXTEND              LOOPS IN X SEC INCREMENTS FOR NUMBER OF
 0656    REF   5 LAST 455      17,3206  23'545 1           QXCH     QPLAC
 0657    REF   5 LAST 483      17,3207  55'676 0           TS       COUNTPL      NUMBER PUT INTO LENGTHOT
 0658    REF   6 LAST 491      17,3210  11'676 0  WAITLP1  CCS      COUNTPL
 0659                          17,3211  0 3215 1           TC       +4
 0660    REF   6 LAST 491      17,3212  0 1545 1           TC       QPLAC
 0661                          17,3213  0 3215 1           TC       +2
 0662    REF   1               17,3214  0 3207 1           TC       WAITLP1 -1
 0663                          17,3215  0 0004 0           INHINT
 0664    REF   5 LAST 483      17,3216  31'527 0           CAE      LENGTHOT
 0665    REF  70 LAST 469      17,3217  0 4536 0           TC       WAITLIST
 0666                          17,3220   03233 0           2CADR    WAITLP3
C0666    REF   1               17,3221   36005 1
 0667                          17,3222  0 0003 1           RELINT
 0668    REF   7 LAST 491      17,3223  11'676 0           CCS      COUNTPL
 0669    REF   7 LAST 491      17,3224  0 1545 1           TC       QPLAC
 0670    REF   8 LAST 491      17,3225  0 1545 1           TC       QPLAC
 0671                          17,3226  1 3227 1           NOOP
 0672    REF   8 LAST 491      17,3227  55'676 0  WAITLP2  TS       COUNTPL      ENTER HERE AFTER DOING CALLING JOB
 0673    REF   1               17,3230  3 3232 1           CAF      WTLPCADR
 0674    REF  11 LAST 469      17,3231  0 4416 0           TC       JOBSLEEP
 0675    REF   2 LAST 491      17,3232   37210 0  WTLPCADR CADR     WAITLP1
 0676    REF   2 LAST 491      17,3233  3 3232 1  WAITLP3  CAF      WTLPCADR
 0677    REF   9 LAST 468      17,3234  0 4422 1           TC       JOBWAKE
 0678    REF  61 LAST 469      17,3235  0 4602 1           TC       TASKOVER



 0679    REF 169 LAST 473      17,3236  54 001 1  ZEROING  TS       L
 0680                          17,3237  1 3241 1           TCF      +2
 0681    REF   3 LAST 479      17,3240  55'776 1  ZEROING1 TS       ZERONDX
 0682    REF 181 LAST 487      17,3241  3 7665 0           CAF      ZERO
 0683    REF 170 LAST 491      17,3242  50 001 0           INDEX    L
 0684                          17,3243  54 000 0           TS       0
 0685    REF 171 LAST 491      17,3244  24 001 0           INCR     L
 0686    REF   4 LAST 491      17,3245  11'776 1           CCS      ZERONDX
 0687    REF   1               17,3246  1 3240 0           TCF      ZEROING1
 0688    REF 276 LAST 489      17,3247  0 0002 0           TC       Q
 0689    REF  44 LAST 490      17,3250  0 6000 1  COMPUT   TC       INTPRET      CALCULATE LENGTH OF GRAVITY VECTOR AS
 0690                          17,3251   77170 1           AXT,1    AXT,2        MEASURED BY ACCELEROMETERS
 0691                          17,3252   00026 0                    22D
 0692                          17,3253   00012 1                    10D
 0693                          17,3254   77731 1           SSP
 0694    REF  15 LAST 490      17,3255   00051 0                    S1
 0695                          17,3256   00004 0                    4
 0696                          17,3257   77731 1           SSP
 0697    REF  13 LAST 451      17,3260   00052 0                    S2
 0698                          17,3261   00004 0                    4
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0699                         17,3262   44743 1  LOPDELOP DLOAD* DSU*
0700  REF  19 LAST 489       17,3263   76120 0                  DATAPL +24D,2
0701  REF  20 LAST 492       17,3264   01657 1                  DATAPL +24D,1
0702                         17,3265   41323 0           PDDL*  DMP
0703  REF  46 LAST 480       17,3266   76156 1                  GENPL +24D,2
0704  REF   2 LAST 477       17,3267   37665 0                  DEC585
0705                         17,3270   77671 1           DDV
0706                         17,3271   55504 0           TIX,2  VDEF
0707  REF   1                17,3272   37277 1                  NEXT
0708                         17,3273   45046 1           ABVAL  RTB
0709  REF   4 LAST 477       17,3274   33406 0                  SGNAGREE
0710  REF  22 LAST 486       17,3275   36337 0           STCALL DSPTEM2
0711  REF   1                17,3276   37301 1                  KODU
0712                         17,3277   60006 1  NEXT     PUSH   TIX,1
0713  REF   1                17,3300   37262 0                  LOPDELOP
0714                         17,3301   77776 1  KODU     EXIT
0715  REF  14 LAST 463       17,3302   0 5317 1          TC     GRABWAIT
0716  REF   5 LAST 478       17,3303   0 3576 0          TC     SHOW
0717  REF  45 LAST 491       17,3304   0 6000 1          TC     INTPRET
0718                         17,3305   41535 1           SLOAD  PUSH
0719  REF  21 LAST 492       17,3306   01630 0                  DATAPL +1
0720                         17,3307   41535 1           SLOAD  PUSH
0721  REF  22 LAST 492       17,3310   01634 1                  DATAPL +5
0722                         17,3311   55535 1           SLOAD  VDEF
0723  REF  23 LAST 492       17,3312   01640 1                  DATAPL +11
0724                         17,3313   76456 1           UNIT   VSL1
0725                         17,3314   77606 1           PUSH
0726                         17,3315   41535 1           SLOAD  PUSH
0727  REF  24 LAST 492       17,3316   01644 0                  DATAPL +15
0728                         17,3317   41535 1           SLOAD  PUSH
0729  REF  25 LAST 492       17,3320   01650 0                  DATAPL +21
0730                         17,3321   55535 1           SLOAD  VDEF
0731  REF  26 LAST 492       17,3322   01654 1                  DATAPL +25
0732                         17,3323   76456 1           UNIT   VSL1
0733                         17,3324   45325 1           PDDL   DSU
0734  REF  27 LAST 492       17,3325   01655 0                  DATAPL +26
0735  REF  28 LAST 492       17,3326   01641 0                  DATAPL +12
0736                         17,3327   77612 1           SL4
0737                         17,3330   77652 0           SL3
0738  REF   6 LAST 491       17,3331   23530 0           STOVL  LENGTHOT
0739                         17,3332   51435 1           VXV    ABVAL
0740                         17,3333   56205 0           DMP    DDV
0741  REF   1                17,3334   37670 1                  ERUNITS
0742  REF   7 LAST 492       17,3335   01530 0                  LENGTHOT
0743                         17,3336   77624 1           RTB
0744  REF   5 LAST 492       17,3337   33406 0                  SGNAGREE
0745  REF  23 LAST 492       17,3340   00337 0           STORE  DSPTEM2
0746                         17,3341   77776 1           EXIT
0747  REF   6 LAST 492       17,3342   0 3576 0          TC     SHOW
0748  REF   1                17,3343   1 2402 1          TCF    RADCK
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L       IMU PERFORMANCE TESTS 2                                                     USER'S OWN PAGE NO.  19

 0749                        17,3344  0 0006 1  NBPOSPL  EXTEND               SETS UP AZIMUTH AND VERTICAL VECTORS FOR
 0750   REF  33 LAST 490     17,3345  23'546 1           QXCH     QPLACE      AXISGEN,RESULTS TO BE USED IN CALCGA TO
 0751   REF  46 LAST 492     17,3346  0 6000 1           TC       INTPRET
 0752                        17,3347   54160 1           AXC,1    XSU,1       AZIMUTH IN NB COORDS
 0753   REF   1              17,3350   37704 0                    SCNBAZ
 0754   REF   2 LAST 482     17,3351   01536 0                    NBPOS
 0755                        17,3352   77773 1           VLOAD*
 0756                        17,3353   00001 0                    0,1
 0757   REF  38 LAST 490     17,3354   01445 0           STORE    STARAD

 0758                        17,3355   54160 1           AXC,1    XSU,1       VERTICAL IN NB COORDS
 0759   REF   1              17,3356   37716 0                    SCNBVER
 0760   REF   3 LAST 493     17,3357   01536 0                    NBPOS
 0761                        17,3360   77773 1           VLOAD*
 0762                        17,3361   00001 0                    0,1
 0763   REF  39 LAST 493     17,3362   07453 1           STODL    STARAD +6
 0764   REF   8 LAST 463     17,3363   33042 1                    ZERODP
 0765                        17,3364   06007 0           STODL    6D
 0766   REF   5 LAST 455     17,3365   01507 1                    AZIMUTH
 0767                        17,3366   57546 1           COS      DCOMP
 0768                        17,3367   06011 1           STODL    8D
 0769   REF   6 LAST 493     17,3370   01507 1                    AZIMUTH
 0770                        17,3371   77756 0           SIN
 0771                        17,3372   00013 0           STORE    10D         VERTICAL IN CER
 0772                        17,3373   77775 1           VLOAD
 0773   REF   2 LAST 493     17,3374   37717 1                    SCNBVER
 0774                        17,3375   36015 0           STCALL   12D
 0775   REF   2 LAST 448     17,3376   32677 0                    AXISGEN
 0776                        17,3377   77776 1           EXIT

 0777   REF   2 LAST 476     17,3400  3 3663 1  SELPOSN  CA       DEC17
 0778   REF   5 LAST 491     17,3401  55'776 1           TS       ZERONDX
 0779   REF   1              17,3402  3 3703 0           CA       XSMADR
 0780   REF   3 LAST 479     17,3403  0 3236 0           TC       ZEROING

 0781   REF  12 LAST 482     17,3404  51'544 0           INDEX    POSITON
 0782                        17,3405  0 3406 0           TC       +1
 0783   REF   1              17,3406  0 3524 1           TC       OPCHKPOS    OPCHK WILL PUT ZERO IN POSITON
 0784   REF   1              17,3407  0 3422 0           TC       POSN1
 0785   REF   1              17,3410  0 3431 1           TC       POSN2
 0786   REF   1              17,3411  0 3436 0           TC       POSN3
 0787   REF   1              17,3412  0 3450 0           TC       POSN4
 0788   REF   1              17,3413  0 3460 0           TC       POSN5
 0789   REF   1              17,3414  0 3470 1           TC       POSN6
 0790   REF   1              17,3415  0 3500 1           TC       POSN7
 0791   REF   1              17,3416  0 3513 0           TC       POSN8
 0792   REF   1              17,3417  0 3542 1           TC       POSN9
 0793   REF   1              17,3420  0 3553 1           TC       POSN10

 07931  REF   1              17,3421  0 3564 0           TC       POSN11       COMPASS POSITION
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L        IMU PERFORMANCE TESTS 2                                                       USER'S OWN PAGE NO.  20

R0794    WE WILL DENOTE THE FLASHING DISPLAY OF A HORIZONTAL TEST BY DH
R0795    (XXX.XX MERU) AND A VERTICAL TEST BY DV (XXX.XX MERU) EACH POSITION TELL
R0796    HOW THE DISPLAYS ARE RELATED TO TTHE DRIFT COEFFICIENTS BEING MEASURED.
R0797    NOTE THAT IT IS ILLEGAL TO RUN VERTICAL IN POS 6,4, OR 2 WITHOUT FIRST
R0798    RUNNING HORIZONTAL OF POS 5,3, OR1. THIS IS BECAUSE THE HORIZ DRIFT CALC
R0799    IN 1,3, OR 5 IS USED AS EAST DRIFFFT FOR VERTICAL TEST. THIS IS DONE BY
R0800    THE MACHINE AUTOMATICALLY EXCEPT FOR VERTICAL POSITION 6 WHICH THE
R0801    OPERATOR MUST DO. (SEE POSITION 6 BELOW)
 0802    REF  20 LAST 451     17,3422  3 7642 0  POSN1     CA      HALF              X UP, Y SOUTH, Z EAST
 0803    REF  27 LAST 490     17,3423  55'400 0            TS      XSM
 0804    REF  14 LAST 490     17,3424  55'410 1            TS      YSM +2              NBDY = DH
 0805    REF  12 LAST 478     17,3425  55'420 1            TS      ZSM +4
 0806    REF 182 LAST 491     17,3426  3 7665 0  NGUBGH    CA      ZERO
 0807    REF  13 LAST 488     17,3427  55'541 1            TS      PIPINDEX
 0808    REF  34 LAST 493     17,3430  0 1546 1            TC      QPLACE


 0817    REF  21 LAST 494     17,3431  4 7642 1  POSN2     CS      HALF              X DOWN, Y WEST, Z NORTH
 0818    REF  28 LAST 494     17,3432  55'400 0            TS      XSM
 0819    REF  15 LAST 494     17,3433  55'412 0            TS      YSM +4             NBDZ =DH ,NBDX -ADIAX= -DV
 0820    REF  13 LAST 494     17,3434  55'416 1            TS      ZSM +2
 0821    REF   1              17,3435  0 3426 1            TC      NGUBGH


 0832    REF  22 LAST 494     17,3436  3 7642 0  POSN3     CA      HALF               Z UP, Y WEST ,X NORTH
 0833    REF  14 LAST 494     17,3437  55'414 0            TS      ZSM
 0834                         17,3440  4 0000 0            COM                          NBDX = -DH
 0835    REF  29 LAST 494     17,3441  55'402 1            TS      XSM +2
 0836    REF  16 LAST 494     17,3442  55'412 0            TS      YSM +4
 0837    REF  69 LAST 489     17,3443  3 7656 0  NSFLAGD   CA      TWO
 0838    REF  14 LAST 494     17,3444  55'541 1            TS      PIPINDEX
 0839    REF 183 LAST 494     17,3445  3 7665 0  NSBUGD    CA      ZERO
 0840    REF   4 LAST 477     17,3446  55'576 0            TS      DRIFTT
 0841    REF  35 LAST 494     17,3447  0 1546 1            TC      QPLACE


 0842    REF  23 LAST 494     17,3450  4 7642 1  POSN4     CS      HALF              Y SOUTH, X EAST, Z DOWN
 0843    REF  15 LAST 494     17,3451  55'414 0            TS      ZSM                NBDY +ADSRAY=DH
 0844                         17,3452  4 0000 0            COM                        NBDZ +ADIAZ =DV
 0845    REF  17 LAST 494     17,3453  55'410 1            TS      YSM +2
 0846    REF  30 LAST 494     17,3454  55'404 1            TS      XSM +4
 0847    REF  70 LAST 494     17,3455  3 7656 0            CA      TWO
 0848    REF  15 LAST 494     17,3456  55'541 1            TS      PIPINDEX
 0852    REF  36 LAST 494     17,3457  0 1546 1            TC      QPLACE
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L         IMU PERFORMANCE TESTS 2                                                                  USER'S OWN PAGE NO.  21

 0855     REF  24 LAST 494     17,3460  3 7642 0  POSN5     CA       HALF                 Y UP, Z NORTH, X WEST
 0856     REF  18 LAST 494     17,3461  55'406 0            TS       YSM
 0857                          17,3462  4 0000 0            COM                             NBDZ-ADSRAZ =DH
 0858     REF  31 LAST 494     17,3463  55'404 1            TS       XSM +4
 0859     REF  16 LAST 494     17,3464  55'416 1            TS       ZSM +2
 0860     REF 130 LAST 484     17,3465  3 7657 1            CA       ONE
 0861     REF  16 LAST 494     17,3466  55'541 1            TS       PIPINDEX
 0862     REF   1              17,3467  0 3445 1            TC       NSBUGD


R0866     TO RUN POSITION 6 VERTICAL AFTER PIP TEST POS 6 IS DISPLAYED THE OPERATR
R0867     MUST CALCULATE FROM 2.5 -NBDZ-ADSRAZ  (XXX.XX)MERU.    WHEN PI
R0868     IP DATA FLASHES DO VERB 33 ENTER. THIS STARTS VERTICAL TEST. THEN THE
R0869     DATA XXX.XX MERU AS CALCULATED MUST BE ENTERED INTO DRIFTT. IE VERB 21
R0870     ENTER NOUN 01 ENTER LOCATION OF DRIFTT ENTER + (OR -) XXXXX ENTER
 0871     REF  25 LAST 495     17,3470  3 7642 0  POSN6     CA       HALF                 Y DOWN, Z EAST, X SOUTH
 0872     REF  32 LAST 495     17,3471  55'402 1            TS       XSM +2
 0873     REF  17 LAST 495     17,3472  55'420 1            TS       ZSM +4
 0874                          17,3473  4 0000 0            COM                             NBDX +ADSRAX = DH, NBDY -ADIAY = -DV
 0875     REF  19 LAST 495     17,3474  55'406 0            TS       YSM
 0876     REF 131 LAST 495     17,3475  3 7657 1            CA       ONE
 0877     REF  17 LAST 495     17,3476  55'541 1            TS       PIPINDEX
 0878     REF  37 LAST 494     17,3477  0 1546 1            TC       QPLACE


 0883     REF  26 LAST 495     17,3500  4 7642 1  POSN7     CS       HALF                 Z UP-EAST.Y UP-WEST.X NORTH.THIS POSITON
 0884     REF  33 LAST 495     17,3501  55'402 1            TS       XSM +2
 0885     REF   1              17,3502  3 3677 1            CA       ROOT1/2
 0886     REF  20 LAST 495     17,3503  55'406 0            TS       YSM                    NBDX - .707 ADSRAX = -DH
 0887     REF  18 LAST 495     17,3504  55'414 0            TS       ZSM
 0888     REF  19 LAST 495     17,3505  55'420 1            TS       ZSM +4
 0889                          17,3506  4 0000 0            COM
 0890     REF  21 LAST 495     17,3507  55'412 0            TS       YSM +4
 0891     REF 164 LAST 494     17,3510  3 7665 0  GEORGES   CA       ZERO
 0892     REF  10 LAST 489     17,3511  55'363 1            TS       FAILREG
 0893     REF   2 LAST 495     17,3512  0 3445 1            TC       NSBUGD


 0907     REF  27 LAST 495     17,3513  3 7642 0  POSN8     CA       HALF                 Z UP-SOUTH,Y UP-NORTH,X EAST.THIS POSITN
 0908     REF  34 LAST 495     17,3514  55'404 1            TS       XSM +4
 0909     REF   2 LAST 495     17,3515  3 3677 1            CA       ROOT1/2                .707(-NBDZ-NBDY) +.5(ADIAZ-ADIAY)
 0910     REF  22 LAST 495     17,3516  55'406 0            TS       YSM                  +.5(ADSRAY +ADSRAZ)=DH
 0911     REF  20 LAST 495     17,3517  55'416 1            TS       ZSM +2
 0912     REF  21 LAST 495     17,3520  55'414 0            TS       ZSM
 0913                          17,3521  4 0000 0            COM
 0914     REF  23 LAST 495     17,3522  55'410 1            TS       YSM +2
 0915     REF   3 LAST 495     17,3523  0 3445 1            TC       NSBUGD
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L        IMU PERFORMANCE TESTS 2                                                         USER'S OWN PAGE NO.  22

 0922   REF    1            17,3524  3 3700 0  OPCHKPOS CA     ROOT1SQ                  OG=+45DEG,IG=-45DEG,MG=+45DEG.
 0923   REF   35 LAST 495   17,3525  55'400 0           TS     XSM
 0924   REF   24 LAST 495   17,3526  55'410 1           TS     YSM +2
 0925   REF   25 LAST 496   17,3527  55'412 0           TS     YSM +4
 0926   REF   22 LAST 495   17,3530  55'414 0           TS     ZSM
 0927   REF    3 LAST 495   17,3531  3 3677 1           CA     ROOT1/2
 0928   REF   26 LAST 496   17,3532  55'406 0           TS     YSM
 0929   REF    1            17,3533  3 3702 1           CA     ROOT3SQ
 0930   REF   36 LAST 496   17,3534  55'402 1           TS     XSM +2
 0931   REF   23 LAST 496   17,3535  55'420 1           TS     ZSM +4
 0932   REF    1            17,3536  4 3701 0           CS     ROOT2SQ
 0933   REF   37 LAST 496   17,3537  55'404 1           TS     XSM +4
 0934   REF   24 LAST 496   17,3540  55'416 1           TS     ZSM +2
 0935   REF   38 LAST 495   17,3541  0 1546 1           TC     QPLACE

 0936   REF   28 LAST 495   17,3542  3 7642 0  POSN9    CA     HALF                    X UP EAST,Y UP WEST,Z SOUTH.THIS POSITON
 0937   REF   25 LAST 496   17,3543  55'416 1           TS     ZSM +2
 0938   REF    4 LAST 496   17,3544  3 3677 1           CA     ROOT1/2                  -NBDZ +.707 SRAZ =DH
 0939   REF   38 LAST 496   17,3545  55'400 0           TS     XSM
 0940   REF   39 LAST 496   17,3546  55'404 1           TS     XSM +4
 0941   REF   27 LAST 496   17,3547  55'406 0           TS     YSM
 0942                       17,3550  4 0000 0           COM
 0943   REF   28 LAST 496   17,3551  55'412 0           TS     YSM +4
 0944   REF    4 LAST 495   17,3552  0 3445 1           TC     NSBUGD


 0955   REF   29 LAST 496   17,3553  3 7642 0  POSN10   CA     HALF                    X UP NORTH,Y UP SOUTH,Z EAST.THIS POSITN
 0956   REF   26 LAST 496   17,3554  55'420 1           TS     ZSM +4
 0957   REF    5 LAST 496   17,3555  3 3677 1           CA     ROOT1/2                   .707(NBDY -NBDX) +.5(ADIAY -ADIAX)
 0958   REF   40 LAST 496   17,3556  55'400 0           TS     XSM                      +.5(ADSRAX) = DH
 0959   REF   29 LAST 496   17,3557  55'406 0           TS     YSM
 0960   REF   30 LAST 496   17,3560  55'410 1           TS     YSM +2
 0961                       17,3561  4 0000 0           COM
 0962   REF   41 LAST 496   17,3562  55'402 1           TS     XSM +2
 0963   REF    5 LAST 496   17,3563  0 3445 1           TC     NSBUGD


 0964   REF   88 LAST 490   17,3564  0 4063 0  POSN11   TC     BANKCALL                 COMPASS POSITION
 0965   REF    1            17,3565   43107 0           CADR   LOADXSM
 0966   REF   39 LAST 496   17,3566  0 1546 1           TC     QPLACE


 0970   REF   24 LAST 492   17,3567  3 0336 1  SHOWLD   CA     DSPTEM2
 0971   REF    8 LAST 492   17,3570  55'527 1           TS     LENGTHOT
 0972   REF   25 LAST 496   17,3571  3 0337 0           CA     DSPTEM2 +1
 0973   REF    4 LAST 493   17,3572  55'536 1           TS     NBPOS
 0974   REF   26 LAST 496   17,3573  3 0340 0           CA     DSPTEM2 +2
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L         IMU PERFORMANCE TESTS 2                                                     USER'S OWN PAGE NO.  23

 0975    REF  13 LAST 493      17,3574  55'544 1            TS      POSITON
 0976    REF 277 LAST 491      17,3575  0 0002 0            TC      Q

 0977                          17,3576  0 0006 1  SHOW      EXTEND
 0978    REF  40 LAST 496      17,3577  23'546 1            QXCH    QPLACE
 0979    REF  14 LAST 497      17,3600  3 1544 0  SHOW1     CA      POSITON
 0980    REF  27 LAST 496      17,3601  54 340 1            TS      DSPTEM2 +2
 0981    REF   2 LAST 486      17,3602  3 3657 0            CA      VB06N66
 0982    REF  44 LAST 486      17,3603  0 5332 0            TC      NVSBWAIT
 0983    REF  13 LAST 486      17,3604  0 5274 0            TC      FLASHON
 0984    REF  33 LAST 486      17,3605  0 5140 1            TC      ENDIDLE
 0985    REF   1               17,3606  0 2234 0            TC      FINISH
 0986    REF  41 LAST 497      17,3607  0 1546 1            TC      QPLACE
 0987    REF   2 LAST 475      17,3610  0 3567 0            TC      SHOWLD
 0988    REF   1               17,3611  1 3600 0            TCF     SHOW1


 098801                        17,3612  0 0006 1  LOADGTSM  EXTEND                            THIS LOADS XSM INTO GEOMATRX
 098802 REF  42 LAST 497       17,3613  23'546 1            QXCH    QPLACE
 098803 REF  47 LAST 493       17,3614  0 6000 1            TC      INTPRET
 098804                        17,3615   77775 1            VLOAD
 098805 REF  42 LAST 496       17,3616   01401 0                    XSM
 098806 REF   1                17,3617   23750 1            STOVL   GEOMTRX
 098807 REF  31 LAST 496       17,3620   01407 0                    YSM
 098808 REF   2 LAST 497       17,3621   23756 1            STOVL   GEOMTRX +6
 098809 REF  27 LAST 496       17,3622   01415 0                    ZSM
 09881  REF   3 LAST 497       17,3623   01764 0            STORE   GEOMTRX +12D
 098811                        17,3624   77776 1            EXIT
 098812 REF  43 LAST 497       17,3625  0 1546 1            TC      QPLACE
 09886                         17,3626   00144 0  1SECX     DEC     100
 098861                        17,3627   17127 0  GEORGED   2DEC    .47408845
C098861                        17,3630   16705 1
 098862                        17,3631   07314 0            2DEC    .23125894
C098862                        17,3632   36223 1
 098863                        17,3633   04521 0            2DEC    .14561689
C098863                        17,3634   31140 0
 098864                        17,3635   75755 1  GEORGEC   2DEC    -.06360691
C098864                        17,3636   73521 0
 098865                        17,3637   72476 1            2DEC    -.16806746
C098865                        17,3640   54176 0
 098866                        17,3641   04771 1            2DEC    .15582939
C098866                        17,3642   03365 1
 098867                        17,3643   75644 0  GEORGEB   2DEC    -.06806784
C098867                        17,3644   70661 1
 098868                        17,3645   47762 1            2DEC    -.75079894
C098868                        17,3646   75077 0
 098869                        17,3647   70023 1            2DEC    -.24878704
C098869                        17,3650   73740 0
 0989                                     0014   14C       EQUALS  0014
 0990                          17,3651   02130 1  V21N30E   OCT     02130
 0991                          17,3652   04000 0  DESANGLE  DEC     2048
 0992                          17,3653   04143 0  SFCONST   DEC     .13107
 0993                          17,3654   34000 0  SIZCHK    OCT     34000
 0994                          17,3655   00264 1  180DEC    DEC     180
 0995                          17,3656   07626 1  3990DEC   DEC     3990
 0996                          17,3657   00666 1  VB06N66   OCT     00666
 0997                          17,3660   01130 1  TESTTIME  DEC     600
 0998                          17,3661   01620 1  V16N20S   OCT     01620
 0999                          17,3662   01640 1  V16N40S   OCT     01640
 1000                          17,3663   00021 1  DEC17     DEC     17
 1001                          17,3664   06200 0  DEC585    2DEC    3200 B+14
C1001                          17,3665   00000 1
 1002                          17,3666   00400 0  DELYOFF   OCT     00400
 1003                          17,3667   00024 1  ERUNITS   2DEC    342844 B-28
C1003                          17,3670   35474 0
 1004   REF   7 LAST 493       17,3671   01506 0  GENPLAD   GENADR  AZIMUTH
 1005   REF   1                17,3672   02521 0  GYRODPL   ECADR   GYROD
 1006   REF   8 LAST 472       17,3673   02500 0  OGCPL     ECADR   OGC
 1007                          17,3674   77760 0  LOWFOUR   OCT     77760
 1008                          17,3675   00070 0  DEC56     DEC     56
 1009                          17,3676   10000 0  45DEG     OCT     10000
 1010                          17,3677   13241 1  ROOT1/2   DEC     .353553
 1011                          17,3700   10000 0  ROOT1SQ   DEC     .250000
 1012                          17,3701   15520 1  ROOT2SQ   DEC     .426776
 1013                          17,3702   02260 1  ROOT3SQ   DEC     .073223
 1014   REF  43 LAST 497       17,3703   01400 1  XSMADR    GENADR  XSM
 1018              17,3704   00000 1  SCNBAZ    2DEC    0
C1018              17,3705   00000 1
 1019              17,3706   00000 1            2DEC    0
C1019              17,3707   00000 1
 1020              17,3710   20000 0  LABNBAZ   2DEC    .5
C1020              17,3711   00000 1
 1021              17,3712   00000 1            2DEC    0
C1021              17,3713   00000 1
 1022              17,3714   00000 1            2DEC    0
C1022              17,3715   00000 1
 1023              17,3716   20000 0  SCNBVER   2DEC    .5
C1023              17,3717   00000 1
 1024              17,3720   00000 1            2DEC    0
C1024              17,3721   00000 1
 1025              17,3722   00000 1  LABNBVER  2DEC    0
C1025              17,3723   00000 1
 1026              17,3724   00000 1            2DEC    0
C1026              17,3725   00000 1
 1027              17,3726   57777 1            2DEC    -.5
C1027              17,3727   77777 0
 1028                        17,3730  ENDIMUS2  =
L          IMU PERFORMANCE TESTS 3                                                          USER'S OWN PAGE NO.   1
 0001     REF   1                       16,2520             SETLOC ENDPINS3
 0002     REF  44 LAST 498                   E5             EBANK= XSM


 0500                       16,2520  0 0006 1  SILVER    EXTEND
 0501     REF  44 LAST 497  16,2521  23'546 1            QXCH    QPLACE            SHOULD BE ADDRESS OF STRTWACH

 0502     REF   4 LAST 486  16,2522  11'614 1            CCS     CALCDIR           2F COMMAND IS POSITIVE THE MINUS TORQ
 0503     REF  12 LAST 377  16,2523  3 7647 0            CAF     BIT9               WINDING IS TO BE ENERGIZED
 0504                       16,2524  0 2526 1            TC      +2
 0505     REF   1           16,2525  0 2530 0            TC      TORK               COMMAND IS NEG SO USE PLUS WINDING
 0506                       16,2526  0 0006 1            EXTEND
 0507     REF   3 LAST 485  16,2527  05 014 1            WOR     14C                SELECTS THE MINUS WINDING

 0508     REF  31 LAST 485  16,2530  3 7637 1  TORK      CAF     POSMAX
 0509     REF   3 LAST 485  16,2531  54 047 0            TS      GYROCTR           16383 PULSES =2.8125 DEG LESS ONE PULSE

 0510     REF   2 LAST 474  16,2532  11'616 0            CCS     GYTOBETQ          C(K)= 1 FOR X, -0 FOR Y, -1FOR Z.
 0511     REF   1           16,2533  0 2537 1            TC      SELECTX
 0512     REF  24 LAST 477  16,2534  0 5464 1            TC      CCSHOLE
 0513     REF   1           16,2535  0 2547 0            TC      SELECTZ
 0514     REF   1           16,2536  0 2543 1            TC      SELECTY
 0515     REF   1           16,2537  3 2553 0  SELECTX   CAF     TORKX             BBITS 7AND 10 IN CHANNEL 14 WILL
 0516                       16,2540  0 0006 1            EXTEND                     SELECT X GYRO AND TURN ON BCSW 1/3200
 0517     REF   4 LAST 500  16,2541  05 014 1            WOR     14C               SSEC LATER BY CHANNEL OUTPUT DESIGN.....
 0518     REF  45 LAST 500  16,2542  0 1546 1            TC      QPLACE

 0519     REF   1           16,2543  3 2554 1  SELECTY   CAF     TORKY             BBITS 8 AND 10 TO TORQ Y GYRO
 0520                       16,2544  0 0006 1            EXTEND
 0521     REF   5 LAST 500  16,2545  05 014 1            WOR     14C
 0522     REF  46 LAST 500  16,2546  0 1546 1            TC      QPLACE

 0523     REF   1           16,2547  3 2555 0  SELECTZ   CAF     TORKZ             BBITS 7,8AND 10 TO TORQ Z GYRO
 0524                       16,2550  0 0006 1            EXTEND
 0525     REF   6 LAST 500  16,2551  05 014 1            WOR     14C
 0526     REF  47 LAST 500  16,2552  0 1546 1            TC      QPLACE
 0527                       16,2553   01100 1  TORKX     OCT     01100
 0528                       16,2554   01200 1  TORKY     OCT     01200
 0529                       16,2555   01300 0  TORKZ     OCT     01300
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0530   REF 185 LAST 495    16,2556  3 7665 0  SAMODCHK CAF     ZERO
0531   REF   4 LAST 484    16,2557  55'563 1           TS      TESTNO
0532   REF  10 LAST 465    16,2560  55'550 1           TS      RUN

0533   REF   1             16,2561  0 3150 0           TC      ZEROMODE
0534   REF   1             16,2562  0 3174 0           TC      OPRTRDLY

0535   REF   1             16,2563  0 3244 0           TC      COARZERO

0536   REF   1             16,2564  0 3160 0           TC      ZEROMAIN
0537   REF   2 LAST 501    16,2565  0 3174 0           TC      OPRTRDLY

0538   REF   2 LAST 501    16,2566  0 3150 0           TC      ZEROMODE

0539   REF 186 LAST 501    16,2567  3 7665 0           CAF     ZERO
0540   REF   1             16,2570  0 3102 1           TC      THETADLD

0541   REF   1             16,2571  3 3332 0           CAF     45ANG
0542   REF   2 LAST 501    16,2572  0 3102 1           TC      THETADLD

0543   REF   1             16,2573  0 3260 0           TC      FNZEROFN

0544   REF   1             16,2574  3 3334 0           CAF     90ANG
0545   REF   3 LAST 501    16,2575  0 3102 1           TC      THETADLD

0546   REF   1             16,2576  3 3335 1           CAF     135ANG
0547   REF   4 LAST 501    16,2577  0 3102 1           TC      THETADLD

0548   REF   2 LAST 501    16,2600  3 3332 0           CAF     45ANG
0549   REF   5 LAST 501    16,2601  0 3104 1           TC      THETADLD +2

0550   REF   2 LAST 501    16,2602  0 3260 0           TC      FNZEROFN

0551   REF   1             16,2603  3 3340 0           CAF     180ANG
0552   REF  17 LAST 479    16,2604  54 400 1           TS      THETAD
0553   REF  18 LAST 501    16,2605  54 401 0           TS      THETAD +1
0554   REF   1             16,2606  3 3333 1           CAF     71ANG
0555   REF   6 LAST 501    16,2607  0 3104 1           TC      THETADLD +2

0556   REF   1             16,2610  3 3341 1           CAF     225ANG
0557   REF   7 LAST 501    16,2611  0 3102 1           TC      THETADLD

0558   REF 187 LAST 501    16,2612  3 7665 0           CAF     ZERO
0559   REF   8 LAST 501    16,2613  0 3102 1           TC      THETADLD

0560   REF  71 LAST 494    16,2614  3 7656 0           CAF     TWO
0561   REF  11 LAST 484    16,2615  55'672 1  CHK2     TS      CDUNDX

0562   REF   1             16,2616  3 3342 1           CAF     170ANG
0563   REF  12 LAST 501    16,2617  51'672 0           INDEX   CDUNDX
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 0564   REF  19 LAST 501    16,2620  54 400 1               TS       THETAD

 0565   REF  89 LAST 496    16,2621  0 4063 0               TC       BANKCALL
 0566   REF   5 LAST 489    16,2622   26055 0               CADR     IMUCOARS

 0567   REF   1             16,2623  3 3336 1               CAF      10ANG
 0568   REF   1             16,2624  0 3023 0               TC       CDURATE

 0569   REF   1             16,2625  3 3337 0               CAF      160ANG
 0570   REF   2 LAST 502    16,2626  0 3023 0               TC       CDURATE

 0571   REF   1             16,2627  0 3046 0               TC       CALCRATE

 0572   REF  90 LAST 502    16,2630  0 4063 0               TC       BANKCALL
 0573   REF  25 LAST 490    16,2631   26716 0               CADR     IMUSTALL
 0574   REF   1             16,2632  1 2766 0               TCF      ENDTST03

 0575   REF   2 LAST 501    16,2633  0 3244 0               TC       COARZERO

 0576   REF  13 LAST 501    16,2634  11'672 1               CCS      CDUNDX
 0577   REF   1             16,2635  1 2615 0               TCF      CHK2

 0578   REF   3 LAST 501    16,2636  4 3332 1               CS       45ANG
 0579   REF   9 LAST 501    16,2637  0 3102 1               TC       THETADLD

 0580   REF   3 LAST 501    16,2640  0 3260 0               TC       FNZEROFN

 0581   REF   2 LAST 501    16,2641  4 3335 0               CS       135ANG
 0582   REF  20 LAST 502    16,2642  54 400 1               TS       THETAD
 0583   REF  21 LAST 502    16,2643  54 401 0               TS       THETAD +1
 0584   REF   2 LAST 501    16,2644  4 3333 0               CS       71ANG
 0585   REF  10 LAST 502    16,2645  0 3104 1               TC       THETADLD +2

 0586   REF   4 LAST 502    16,2646  0 3260 0               TC       FNZEROFN

 0587   REF   3 LAST 502    16,2647  0 3244 0               TC       COARZERO

 0588   REF   1             16,2650  0 3215 1               TC       FINEZERO
 0589   REF   2 LAST 502    16,2651  0 3215 1               TC       FINEZERO

 0590   REF   1             16,2652  4 3346 1   CHK5        CS       4+6BITS
 0591                       16,2653  0 0006 1               EXTEND
 0592                       16,2654  03 012 1               WAND     12

 0593   REF  17 LAST 482    16,2655  3 7655 0               CAF      FOUR
 0594   REF  71 LAST 491    16,2656  0 4536 0               TC       WAITLIST
 0595                       16,2657   02663 0               2CADR    ECE1
C0595   REF   1             16,2660   34005 0
 0596   REF   1             16,2661  3 3355 1               CAF      ECE2CADR
 0597   REF  12 LAST 491    16,2662  0 4416 0               TC       JOBSLEEP
 0598  REF   2 LAST 502   16,2663  3 3355 1  ECE1    CAF     ECE2CADR
 0599  REF  10 LAST 491   16,2664  0 4422 1          TC      JOBWAKE
 0600  REF  62 LAST 491   16,2665  0 4602 1          TC      TASKOVER

 0601  REF  16 LAST 465   16,2666  4 6162 0  ECE2    CS      SIX
 0602  REF   5 LAST 501   16,2667  6 1563 0          AD      TESTNO
 0603                     16,2670  0 0006 1          EXTEND
 0604                     16,2671  6 2673 1          BZMF    +2
 0605  REF   1            16,2672  1 2714 0          TCF     CHKX

 0606  REF   6 LAST 503   16,2673  51'563 0          INDEX   TESTNO
 0607  REF   1            16,2674  3 2770 0          CAF     ERCTRANG
 0608  REF  22 LAST 502   16,2675  54 400 1          TS      THETAD
 0609  REF  23 LAST 503   16,2676  54 401 0          TS      THETAD +1
 0610  REF  24 LAST 503   16,2677  54 402 0          TS      THETAD +2

 0611  REF  36 LAST 487   16,2700  3 7652 1          CAF     BIT6
 0612                     16,2701  0 0006 1          EXTEND
 0613                     16,2702  05 012 1          WOR     12

 0614                     16,2703  0 0004 0          INHINT
 0615  REF  72 LAST 501   16,2704  3 7656 0          CAF     TWO
 0616  REF  72 LAST 502   16,2705  0 4536 0          TC      WAITLIST
 0617                     16,2706   02613 1          2CADR   ATTCK2
C0617  REF   3 LAST 273   16,2707   22005 1
 0618                     16,2710  0 0003 1          RELINT

 0619  REF   3 LAST 501   16,2711  0 3174 0          TC      OPRTRDLY

 0620  REF   7 LAST 503   16,2712  25'563 0          INCR    TESTNO

 0621  REF   1            16,2713  1 2652 0          TCF     CHK5

 0622  REF   4 LAST 502   16,2714  0 3244 0  CHKX    TC      COARZERO

 0623  REF 188 LAST 501   16,2715  3 7665 0          CAF     ZERO
 0624  REF   8 LAST 503   16,2716  55'563 1          TS      TESTNO

 0625  REF  91 LAST 502   16,2717  0 4063 0          TC      BANKCALL
 0626  REF   4 LAST 481   16,2720   20247 1          CADR    RRZERO
 0627  REF  92 LAST 503   16,2721  0 4063 0          TC      BANKCALL
 0628  REF   8 LAST 481   16,2722   26712 1          CADR    RADSTALL
 0629  REF   2 LAST 502   16,2723  1 2766 0          TCF     ENDTST03

 0630  REF   9 LAST 503   16,2724  51'563 0  CHK6    INDEX   TESTNO
 0631  REF   1            16,2725  3 2777 1          CAF     RADECNTR
 0632  REF  23 LAST 481   16,2726  54 424 1          TS      TANG +1
 0633  REF  24 LAST 503   16,2727  54 423 0          TS      TANG

 0634  REF  48 LAST 497   16,2730  0 6000 1          TC      INTPRET
 0635                        16,2731   77634 0            CALL
 0636   REF   3 LAST 481     16,2732   20363 0                     RRDESNB

 0637   REF  93 LAST 503     16,2733  0 4063 0            TC       BANKCALL
 0638   REF   9 LAST 503     16,2734   26712 1            CADR     RADSTALL
 0639   REF   3 LAST 503     16,2735  1 2766 0            TCF      ENDTST03

 0640   REF   1              16,2736  0 3167 1            TC       RROPRDLY

 0641   REF  10 LAST 503     16,2737  25'563 0            INCR     TESTNO

 0642   REF  18 LAST 502     16,2740  4 7655 1            CS       FOUR
 0643   REF  11 LAST 504     16,2741  6 1563 0            AD       TESTNO
 0644                        16,2742  0 0006 1            EXTEND
 0645   REF   1              16,2743  6 2724 1            BZMF     CHK6

 0646   REF 189 LAST 503     16,2744  3 7665 0            CAF      ZERO
 0647   REF  12 LAST 504     16,2745  55'563 1            TS       TESTNO
 0648   REF   8 LAST 376     16,2746  54 354 1            TS       ALTRATE
 0649   REF   8 LAST 376     16,2747  54 352 1            TS       ALT
 0650   REF   9 LAST 504     16,2750  54 353 0            TS       ALT +1

 0651   REF 132 LAST 495     16,2751  4 7657 0            CS       ONE
 0652   REF   6 LAST 278     16,2752  54 351 1            TS       DIDFLG

 0653   REF  13 LAST 504     16,2753  51'563 0  CHK7      INDEX    TESTNO
 0654   REF   1              16,2754  3 3004 0            CAF      RRRATFPS
 0655   REF   5 LAST 376     16,2755  54 360 0            TS       FORVEL
 0656   REF   3 LAST 166     16,2756  54 361 1            TS       LATVEL

 0657   REF   2 LAST 504     16,2757  0 3167 1            TC       RROPRDLY

 0658   REF  14 LAST 504     16,2760  25'563 0            INCR     TESTNO

 0659   REF  18 LAST 490     16,2761  4 7653 1            CS       BIT5
 0660   REF  73 LAST 503     16,2762  6 7656 0            AD       TWO
 0661   REF  15 LAST 504     16,2763  6 1563 0            AD       TESTNO
 0662                        16,2764  0 0006 1            EXTEND
 0663   REF   1              16,2765  6 2753 1            BZMF     CHK7

 0664   REF  94 LAST 504     16,2766  0 4063 0  ENDTST03  TC       BANKCALL
 0665   REF  25 LAST 478     16,2767   30745 1            CADR     ENDTEST



 0666                        16,2770   03013 0  ERCTRANG  OCT      03013
 0667                        16,2771   02660 0            OCT      02660
 0668                        16,2772   01042 0            OCT      01042
 0669                      16,2773   00000 1           OCT       00000
 0670                      16,2774   76736 1           OCT       76736
 0671                      16,2775   75120 0           OCT       75120
 0672                      16,2776   74765 0           OCT       74765



 0673                      16,2777   01463 1  RADECNTR OCT       01463
 0674                      16,3000   01042 0           OCT       01042
 0675                      16,3001   00000 1           OCT       00000
 0676                      16,3002   76736 1           OCT       76736
 0677                      16,3003   76315 1           OCT       76315



 0678                      16,3004   00000 1  RRRATFPS OCT       00000
 0679                      16,3005   00001 0           OCT       00001
 0680                      16,3006   00002 0           OCT       00002
 0681                      16,3007   00004 0           OCT       00004
 0682                      16,3010   00010 0           OCT       00010
 0683                      16,3011   00020 0           OCT       00020
 0684                      16,3012   00040 0           OCT       00040
 0685                      16,3013   00100 0           OCT       00100
 0686                      16,3014   00200 0           OCT       00200
 0687                      16,3015   00237 1           OCT       00237
 0688                      16,3016   00400 0           OCT       00400
 0689                      16,3017   00545 0           OCT       00545
 0690                      16,3020   00544 1           OCT       00544
 0691                      16,3021   77540 0           OCT       77540
 0692                      16,3022   77232 1           OCT       77232
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L        IMU PERFORMANCE TESTS 3                                                      USER'S OWN PAGE NO.   7

 0693                         16,3023  0 0006 1  CDURATE  EXTEND
 0694   REF  48 LAST 500      16,3024  23'546 1           QXCH    QPLACE

 0695   REF   1               16,3025  55'577 1           TS      CDULIMIT

 0696   REF  22 LAST 487      16,3026  10 067 1           CCS     NEWJOB
 0697   REF   7 LAST 487      16,3027  0 4404 0           TC      CHANG1

 0698   REF   2 LAST 506      16,3030  4 1577 1           CS      CDULIMIT
 0699   REF  14 LAST 502      16,3031  51'672 0           INDEX   CDUNDX
 0700   REF  22 LAST 490      16,3032  6 0032 0           AD      CDUX            CATCH FIRST PULSE
 0701                         16,3033  0 0006 1           EXTEND
 0702   REF   3 LAST 502      16,3034  6 3026 0           BZMF    CDURATE +3      LOOK AGAIN

 0703   REF  15 LAST 506      16,3035  51'672 0           INDEX   CDUNDX
 0704   REF  23 LAST 506      16,3036  30 032 0           CAE     CDUX
 0705   REF   1               16,3037  57'575 1           XCH     CDUREADF        CDU FINAL READING
 0706   REF   1               16,3040  57'576 1           XCH     CDUREADI        CDU INITIAL READING

 0707   REF   6 LAST 487      16,3041  0 5470 1           TC      FINETIME
 0708   REF   1               16,3042  53'573 0           DXCH    CDUTIMEF        DP FINAL TIME
 0709   REF   1               16,3043  53'571 1           DXCH    CDUTIMEI        DP INITIAL READING

 0710                         16,3044  0 0003 1           RELINT
 0711   REF  49 LAST 506      16,3045  0 1546 1           TC      QPLACE




 0712                         16,3046  0 0006 1  CALCRATE EXTEND
 0713   REF  50 LAST 506      16,3047  23'546 1           QXCH    QPLACE

 0714   REF   2 LAST 506      16,3050  53'576 0           DXCH    CDUREADF
 0715                         16,3051  0 0006 1           EXTEND
 0716   REF 172 LAST 491      16,3052  20 001 1           MSU     L
 0717   REF   1               16,3053  55'677 1           TS      CDUANG

 0718   REF  49 LAST 503      16,3054  0 6000 1           TC      INTPRET
 0719                         16,3055   45345 1           DLOAD   DSU
 0720   REF   2 LAST 506      16,3056   01573 1                   CDUTIMEF
 0721   REF   2 LAST 506      16,3057   01571 0                   CDUTIMEI
 0722                         16,3060   67206 1           PUSH    SLOAD
 0723   REF   2 LAST 506      16,3061   01700 1                   CDUANG
 0724                         16,3062   56261 1           SR      DDV
 0725                         16,3063   00617 1                   14D
 0726                         16,3064   45005 0           DMP     RTB
 0727   REF   1               16,3065   35361 0                   DEG/SEC
 0728   REF   6 LAST 492      16,3066   33406 0                   SGNAGREE
 0729   REF  28 LAST 497      16,3067   00337 0           STORE   DSPTEM2
 0730                              16,3070   77776 1             EXIT

 0731   REF   1                    16,3071   3 3353 1  RATEDSP   CAF      V06N66X
 0732   REF  45 LAST 497           16,3072   0 5332 0            TC       NVSBWAIT
 0733   REF  14 LAST 497           16,3073   0 5274 0            TC       FLASHON
 0734   REF  34 LAST 497           16,3074   0 5140 1            TC       ENDIDLE
 0735   REF   4 LAST 504           16,3075   1 2766 0            TCF      ENDTST03
 0736                              16,3076   1 3100 1            TCF      +2
 0737   REF   1                    16,3077   1 3071 0            TCF      RATEDSP

 0738   REF  11 LAST 501           16,3100   25'550 0            INCR     RUN
 0739   REF  51 LAST 506           16,3101   0 1546 1            TC       QPLACE
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L        IMU PERFORMANCE TESTS 3                                                        USER'S OWN PAGE NO.   9

 0740   REF  25 LAST 503      16,3102  54 400 1  THETADLD TS       THETAD
 0741   REF  26 LAST 508      16,3103  54 401 0           TS       THETAD +1
 0742   REF  27 LAST 508      16,3104  54 402 0           TS       THETAD +2

 0743                         16,3105  0 0006 1           EXTEND
 0744   REF  52 LAST 507      16,3106  23'546 1           QXCH     QPLACE

 0745   REF  10 LAST 434      16,3107  3 7663 0           CAF      SEVEN
 0746   REF  12 LAST 489      16,3110  55'551 0  THLD1    TS       STOREPL

 0747   REF  95 LAST 504      16,3111  0 4063 0           TC       BANKCALL
 0748   REF   6 LAST 502      16,3112   26055 0           CADR     IMUCOARS
 0749   REF  96 LAST 508      16,3113  0 4063 0           TC       BANKCALL
 0750   REF  26 LAST 502      16,3114   26716 0           CADR     IMUSTALL
 0751   REF   5 LAST 507      16,3115  1 2766 0           TCF      ENDTST03

 0752   REF  13 LAST 508      16,3116  11'551 0           CCS      STOREPL
 0753   REF   1               16,3117  0 3110 1           TC       THLD1

 0754   REF   4 LAST 503      16,3120  0 3174 0           TC       OPRTRDLY

 0755   REF  53 LAST 508      16,3121  0 1546 1           TC       QPLACE



 0756                         16,3122  0 0006 1  FINEALGN EXTEND
 0757   REF  54 LAST 508      16,3123  23'546 1           QXCH     QPLACE

 0758   REF  97 LAST 508      16,3124  0 4063 0           TC       BANKCALL
 0759   REF   5 LAST 490      16,3125   26227 1           CADR     IMUFINE
 0760   REF  98 LAST 508      16,3126  0 4063 0           TC       BANKCALL
 0761   REF  27 LAST 508      16,3127   26716 0           CADR     IMUSTALL
 0762   REF   6 LAST 508      16,3130  1 2766 0           TCF      ENDTST03

 0763   REF  55 LAST 508      16,3131  0 1546 1           TC       QPLACE
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0764                        16,3132  0 0006 1  CH30DSPY EXTEND
0765  REF  56 LAST 508      16,3133  23'546 1           QXCH    QPLACE

0766  REF   1               16,3134  3 3344 1           CAF     OCT30
0767  REF 571 LAST 489      16,3135  54 142 1           TS      MPAC +2
0768  REF   1               16,3136  3 3347 1           CAF     V01N10X
0769  REF  46 LAST 507      16,3137  0 5332 0           TC      NVSBWAIT
0770  REF  15 LAST 507      16,3140  0 5274 0           TC      FLASHON
0771  REF  35 LAST 507      16,3141  0 5140 1           TC      ENDIDLE
0772  REF   7 LAST 508      16,3142  1 2766 0           TCF     ENDTST03
0773                        16,3143  1 3145 0           TCF     +2
0774  REF   1               16,3144  1 3134 0           TCF     CH30DSPY +2

0775  REF   4 LAST 337      16,3145  0 5300 1           TC      FLASHOFF
0776  REF  12 LAST 507      16,3146  25'550 0           INCR    RUN
0777  REF  57 LAST 509      16,3147  0 1546 1           TC      QPLACE



0778                        16,3150  0 0006 1  ZEROMODE EXTEND
0779  REF  58 LAST 509      16,3151  23'546 1           QXCH    QPLACE

0780  REF  99 LAST 508      16,3152  0 4063 0           TC      BANKCALL
0781  REF   9 LAST 490      16,3153   26000 0           CADR    IMUZERO
0782  REF 100 LAST 509      16,3154  0 4063 0           TC      BANKCALL
0783  REF  28 LAST 508      16,3155   26716 0           CADR    IMUSTALL
0784  REF   8 LAST 509      16,3156  1 2766 0           TCF     ENDTST03

0785  REF  59 LAST 509      16,3157  0 1546 1           TC      QPLACE



0786  REF   2 LAST 502      16,3160  4 3346 1  ZEROMAIN CS      4,6BITS
0787                        16,3161  0 0006 1           EXTEND
0788                        16,3162  03 012 1           WAND    12

0789  REF  19 LAST 504      16,3163  3 7653 0           CAF     BIT5
0790                        16,3164  0 0006 1           EXTEND
0791                        16,3165  05 012 1           WOR     12

0792  REF 278 LAST 497      16,3166  0 0002 0           TC      Q
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0793                          16,3167   0 0006 1   RROPRDLY EXTEND
0794   REF    9 LAST 491      16,3170  23'545 1            QXCH    QPLAC

0795   REF   13 LAST 509      16,3171  25'550 0            INCR    RUN

0796   REF    1               16,3172   3 3352 0           CAF     V06N40X
0797   REF    5 LAST 508      16,3173   1 3200 1           TCF     OPRTRDLY +4




0798                          16,3174   0 0006 1   OPRTRDLY EXTEND
0799   REF   10 LAST 510      16,3175  23'545 1            QXCH    QPLAC

0800   REF   14 LAST 510      16,3176  25'550 0            INCR    RUN
0801   REF    1               16,3177   3 3351 0           CAF     V06N20X
0802   REF   47 LAST 509      16,3200   0 5332 0           TC      NVSBWAIT
0803   REF    1               16,3201   3 3354 0           CAF     V33N00X
0804   REF   48 LAST 510      16,3202   0 5332 0           TC      NVSBWAIT
0805   REF   15 LAST 510      16,3203   3 1550 0           CA      RUN
0806   REF    1               16,3204   7 3343 1           MASK    6LOW
0807   REF   49 LAST 510      16,3205   0 5332 0           TC      NVSBWAIT
0808   REF   16 LAST 509      16,3206   0 5274 0           TC      FLASHON
0809   REF   36 LAST 509      16,3207   0 5140 1           TC      ENDIDLE
0810   REF    9 LAST 509      16,3210   1 2766 0           TCF     ENDTST03
0811                          16,3211   1 3213 0           TCF     +2
0812   REF    6 LAST 510      16,3212   1 3177 1           TCF     OPRTRDLY +3

0813   REF    5 LAST 509      16,3213   0 5300 1           TC      FLASHOFF
0814   REF   11 LAST 510      16,3214   0 1545 1           TC      QPLAC

0815                          16,3215   0 0006 1   FINEZERO EXTEND
0816   REF   12 LAST 510      16,3216  23'545 1            QXCH    QPLAC

0817   REF  101 LAST 509      16,3217   0 4063 0           TC      BANKCALL
0818   REF   10 LAST 509      16,3220    26000 0           CADR    IMUZERO

0819   REF   74 LAST 504      16,3221   3 7656 0           CAF     TWO
0820   REF    6 LAST 462      16,3222  55'512 1            TS      EROPTN
0821   REF   19 LAST 504      16,3223   3 7655 0           CAF     FOUR
0822   REF   15 LAST 497      16,3224  55'544 1            TS      POSITON

0823                          16,3225   0 0004 0           INHINT
0824   REF   41 LAST 484      16,3226   4 7646 0           CS      BIT10
0825   REF   25 LAST 459      16,3227   7 0061 1           MASK    STATE
0826   REF   42 LAST 510      16,3230   6 7646 1           AD      BIT10
0827   REF   26 LAST 510      16,3231  54 061 1            TS      STATE
0828                          16,3232   0 0003 1           RELINT
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0829  REF 102 LAST 510   16,3233  0 4063 0           TC      BANKCALL
0830  REF   2 LAST 444   16,3234    30760 0           CADR    LEMLAB

0831  REF  15 LAST 492   16,3235  0 5317 1  SAMODRTN TC      GRABWAIT

0832  REF   2 LAST 510   16,3236  3 3351 0           CAF     V06N20X
0833  REF  50 LAST 510   16,3237  0 5332 0           TC      NVSBWAIT

0834  REF   2 LAST 501   16,3240  0 3160 0           TC      ZEROMAIN

0835  REF   2 LAST 509   16,3241  0 3132 1           TC      CH30DSPY
0836  REF   3 LAST 501   16,3242  0 3150 0           TC      ZEROMODE

0837  REF  13 LAST 510   16,3243  0 1545 1           TC      QPLAC


0838  REF 190 LAST 504   16,3244  3 7665 0  COARZERO CAF     ZERO
0839  REF  28 LAST 508   16,3245  54 400 1           TS      THETAD
0840  REF  29 LAST 511   16,3246  54 401 0           TS      THETAD +1
0841  REF  30 LAST 511   16,3247  54 402 0           TS      THETAD +2

0842                     16,3250  0 0006 1           EXTEND
0843  REF  60 LAST 509   16,3251  23'546 1           QXCH    QPLACE

0844  REF 103 LAST 511   16,3252  0 4063 0           TC      BANKCALL
0845  REF   7 LAST 508   16,3253    26055 0           CADR    IMUCOARS
0846  REF 104 LAST 511   16,3254  0 4063 0           TC      BANKCALL
0847  REF  29 LAST 509   16,3255    26716 0           CADR    IMUSTALL
0848  REF  10 LAST 510   16,3256  1 2766 0           TCF     ENDTST03

0849  REF  61 LAST 511   16,3257  0 1546 1           TC      QPLACE
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 0850                       16,3260  0 0006 1  FNZEROFN EXTEND
 0851   REF  14 LAST 511    16,3261  23'545 1           QXCH    QPLAC

 0852   REF   1             16,3262  0 3122 0           TC      FINEALGN

 0853   REF  24 LAST 506    16,3263  30 032 0           CAE     CDUX
 0854   REF   3 LAST 506    16,3264  55'575 0           TS      CDUREADF
 0855   REF   7 LAST 490    16,3265  30 033 1           CAE     CDUY
 0856   REF   2 LAST 506    16,3266  55'576 0           TS      CDUREADI
 0857   REF  12 LAST 490    16,3267  30 034 0           CAE     CDUZ
 0858   REF   3 LAST 506    16,3270  55'577 1           TS      CDULIMIT

 0859   REF   4 LAST 511    16,3271  0 3150 0           TC      ZEROMODE

 0860   REF   1             16,3272  3 3345 0           CAF     3SEC
 0861   REF  73 LAST 503    16,3273  0 4536 0           TC      WAITLIST
 0862                       16,3274   03300 1           2CADR   FZF1
C0862   REF   1             16,3275   34005 0
 0863   REF   1             16,3276  3 3356 1           CAF     FZF2CADR
 0864   REF  13 LAST 502    16,3277  0 4416 0           TC      JOBSLEEP

 0865   REF   2 LAST 512    16,3300  3 3356 1  FZF1     CAF     FZF2CADR
 0866   REF  11 LAST 503    16,3301  0 4422 1           TC      JOBWAKE
 0867   REF  63 LAST 503    16,3302  0 4602 1           TC      TASKOVER

 0868   REF   4 LAST 512    16,3303  31'575 1  FZF2     CAE     CDUREADF
 0869                       16,3304  0 0006 1           EXTEND
 0870   REF  25 LAST 512    16,3305  20 032 1           MSU     CDUX
 0871   REF  46 LAST 482    16,3306  54 333 0           TS      DSPTEM1

 0872   REF   3 LAST 512    16,3307  31'576 1           CAE     CDUREADI
 0873                       16,3310  0 0006 1           EXTEND
 0874   REF   8 LAST 512    16,3311  20 033 0           MSU     CDUY
 0875   REF  47 LAST 512    16,3312  54 334 1           TS      DSPTEM1  +1

 0876   REF   4 LAST 512    16,3313  31'577 0           CAE     CDULIMIT
 0877                       16,3314  0 0006 1           EXTEND
 0878   REF  13 LAST 512    16,3315  20 034 1           MSU     CDUZ
 0879   REF  48 LAST 512    16,3316  54 335 0           TS      DSPTEM1  +2

 0880   REF   1             16,3317  3 3350 1  FZFDSP   CAF     V05N30X
 0881   REF  51 LAST 511    16,3320  0 5332 0           TC      NVSBWAIT
 0882   REF  17 LAST 510    16,3321  0 5274 0           TC      FLASHON
 0883   REF  37 LAST 510    16,3322  0 5140 1           TC      ENDIDLE
 0884   REF  11 LAST 511    16,3323  1 2766 0           TCF     ENDTST03
 0885                       16,3324  1 3326 1           TCF     +2
 0886   REF   1             16,3325  1 3317 0           TCF     FZFDSP

 0887   REF  16 LAST 510    16,3326  25'550 0           INCR    RUN
 0888   REF  15 LAST 512    16,3327  0 1545 1           TC      QPLAC
 0889                        16,3330   00133 0  1ANG      OCT     00133
 0890                        16,3331   06000 1  33.75ANG OCT     06000
 0891                        16,3332   10000 0  45ANG    OCT     10000
 0892                        16,3333   14477 0  71ANG    OCT     14477
 0893                        16,3334   20000 0  90ANG    OCT     20000
 0894                        16,3335   30000 1  135ANG   OCT     30000
 0895                        16,3336   01616 1  10ANG    OCT     01616
 0896                        16,3337   34344 0  160ANG   OCT     34344
 0897                        16,3340   40000 0  180ANG   OCT     40000
 0898                        16,3341   50000 1  225ANG   OCT     50000
 0899                        16,3342   36162 1  170ANG   OCT     36162

 0900                        16,3343   00077 1  6LOW     OCT     77
 0901                        16,3344   00030 1  OCT30    OCT     30
 0902                        16,3345   00454 1  3SEC     DEC     300
 0903                        16,3346   00050 1  4+6BITS  OCT     00050

 0904                        16,3347   00110 1  V01N10X  OCT     00110
 0905                        16,3350   00530 1  V05N30X  OCT     00530
 0906                        16,3351   00620 0  V06N20X  OCT     00620
 0907                        16,3352   00640 0  V06N40X  OCT     00640
 0908                        16,3353   00666 1  V06N66X  OCT     00666
 0909                        16,3354   03300 1  V33N00X  OCT     03300

 0910   REF    1             16,3355   34666 0  ECE2CADR CADR    ECE2
 0911   REF    1             16,3356   35303 1  FZF2CADR CADR    FZF2
 0912   REF    9 LAST 498    16,3357   02500 0  OGCECADR ECADR   OGC

 0913                        16,3360   00043 0  DEG/SEC  2DEC    576000 B-28
C0913                        16,3361   05000 1



 0914                                  16,3362  ENDIMUS3 EQUALS
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L       OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                         USER'S OWN PAGE NO.   1
R000001 THIS PROGRAM USES A VERTICAL,SOUTH,EAST COORDINATE SYSTEM FOR PIPAS
 0001                           21,2000                 BANK    21
 0003   REF  45 LAST 500             E5                 EBANK=  XSM


R0004   G SCHMIDT SIMPLIFIED ESTIMATION PROGRAM FOR ALIGNMENT CALIBRATION. THE
R0005   PROGRAM IS COMPLETELY RESTART PROFED. DATA STORED IN BANK4.
 0010   REF   3 LAST 478    21,2000  0 4614 0  ESTIMS   TC      PHASCHNG
 0011                       21,2001   00101 1           OCT     00101
 0012                       21,2002  0 0004 0  RSTGTS1  INHINT                      COMES HERE PHASE1 RESTART
 0015   REF   8 LAST 370    21,2003  3 0025 0           CA      TIME1
 0016   REF   1             21,2004  55'745 1           TS      GTSWTLST
 0017   REF 191 LAST 511    21,2005  3 7665 0           CAF     ZERO                   ZERO THE PIPAS
 0018   REF  15 LAST 488    21,2006  54 037 1           TS      PIPAX
 0019   REF   5 LAST 480    21,2007  54 040 1           TS      PIPAY
 0020   REF   6 LAST 480    21,2010  54 041 0           TS      PIPAZ
 00201  REF  10 LAST 353    21,2011  54 404 0           TS      DELVX +1
 00202  REF   4 LAST 212    21,2012  54 406 1           TS      DELVY +1
 00203  REF   3 LAST 212    21,2013  54 410 0           TS      DELVZ +1
 0021                       21,2014  0 0003 1           RELINT
 0022   REF   1             21,2015  0 2753 1           TC      SETUPER
 0023   REF   1             21,2016  3 3360 1           CA      77DECML
 0024   REF   6 LAST 493    21,2017  55'776 1           TS      ZERONDX
 0025   REF   1             21,2020  3 3361 0           CA      ALXXXZ
 0026   REF 105 LAST 511    21,2021  0 4063 0           TC      BANKCALL
 0027   REF   4 LAST 493    21,2022   37236 1           CADR    ZEROING
 0028   REF  50 LAST 506    21,2023  0 6000 1           TC      INTPRET
 0029                       21,2024   77775 1           VLOAD
 0030   REF   1             21,2025   03353 1                   INTVAL +2
 0031   REF   1             21,2026   01601 1           STORE   ALX1S
 0032                       21,2027   77776 1           EXIT

 0033   REF   3 LAST 476    21,2030  11'742 0           CCS     GEOCOMPS               GEOCOMPS IN NON ZERO IF COMPASS
 0034                       21,2031  0 2033 0           TC      +2
 0035   REF   1             21,2032  0 2667 1           TC      SLEEPIE +1
 0036   REF   9 LAST 496    21,2033  3 1527 0           CA      LENGTHOT                 TIMES FIVE IS THE NUM OF SEC ERECTING
 0037   REF   1             21,2034  55'746 1           TS      ERECTIME

 0038   REF   5 LAST 459    21,2035  0 4667 1           TC      NEWMODEX
 0039                       21,2036   00005 1           OCT     05
 00391  REF 106 LAST 514    21,2037  0 4063 0           TC      BANKCALL
 003911 REF   1             21,2040   16345 1           CADR    GCOMPZER                 ZERO COMPENSATION PROGRAM REGISTERS
 0040   REF   1             21,2041  0 2740 0           TC      ANNNNNN
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L      OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                      USER'S OWN PAGE NO.   2

 0086                           21,2042  0 0004 0  ALLOOP    INHINT                   TASK EVERY .5 OR 1 SEC (COMPASS-DRIFT)
 0087    REF    9 LAST 514      21,2043  3 0025 0            CA       TIME1
 0088    REF    2 LAST 514      21,2044  55'745 1            TS       GTSWTLST       STORE TIME TO SET UP NEXT WAITLIST
 0089    REF    1               21,2045  3 1664 1  ALLOOP3   CA       ALTIM
 0090    REF    1               21,2046  55'716 1            TS       GEOSAVED
 0091    REF    4 LAST 514      21,2047  0 4614 0            TC       PHASCHNG
 0092                           21,2050   00201 1            OCT      00201
 0093                           21,2051  0 2053 0            TC       +2

 0094                           21,2052  0 0004 0  ALLOOP1   INHINT                  RESTARTS COME IN HERE
 0095    REF    2 LAST 515      21,2053  3 1716 0            CA       GEOSAVED
 0096    REF    2 LAST 515      21,2054  55'664 0            TS       ALTIM
 0097    REF  331 LAST 489      21,2055  10 000 0            CCS      A
 0098    REF  332 LAST 515      21,2056  3 0000 1            CA       A              SHOULD NEVER HIT THIS LOCATION
 0099    REF    1               21,2057  55'665 1            TS       ALTIMS
 0100    REF  333 LAST 515      21,2060  4 0000 0            CS       A
 0101    REF    3 LAST 515      21,2061  55'664 0            TS       ALTIM
 01011   REF   16 LAST 514      21,2062  3 0037 0            CA       PIPAX
 01012   REF   11 LAST 514      21,2063  54 403 1            TS       DELVX
 01013   REF    6 LAST 514      21,2064  3 0040 0            CA       PIPAY
 01014   REF    5 LAST 514      21,2065  54 405 1            TS       DELVY
 01015   REF    7 LAST 514      21,2066  3 0041 1            CA       PIPAZ
 01016   REF    4 LAST 514      21,2067  54 407 0            TS       DELVZ
 010161  REF  192 LAST 514      21,2070  3 7665 0            CAF      ZERO
 010162  REF   17 LAST 515      21,2071  54 037 1            TS       PIPAX
 010163  REF    7 LAST 515      21,2072  54 040 1            TS       PIPAY
 010164  REF    8 LAST 515      21,2073  54 041 0            TS       PIPAZ
 01017   REF    5 LAST 515      21,2074  0 4614 0            TC       PHASCHNG
 01018                          21,2075   00701 1            OCT      00701
 010181                         21,2076  0 0003 1            RELINT
 0113    REF    5 LAST 279      21,2077  3 7642 0  SPECSTS   CAF      PRIO20
 0116    REF    7 LAST 445      21,2100  0 4374 0            TC       FINDVAC
 0117                           21,2101   02104 0            2CADR    ALFLT             START THE JOB
C0117    REF    1               21,2102   42005 1
 0118    REF   64 LAST 512      21,2103  0 4602 1            TC       TASKOVER
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L          OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                            USER'S OWN PAGE NO.  3

 0119   REF    1                21,2104  0 3047 1  ALFLT     TC       STOREDTA          STORE DATA IN CASE OF RESTART IN JOB
 0120   REF    6 LAST 515       21,2105  0 4614 0            TC       PHASCHNG         THIS IS THE JOB DONE EVERY ITERATION
 0121                           21,2106   00601 0            OCT      00601
 01211  REF    4 LAST 514       21,2107  11'742 0            CCS      GEOCOMPS
 01212                          21,2110  0 2112 1            TC       +2
 01213  REF    1                21,2111  0 2116 0            TC       NORMLOP
 01214  REF  107 LAST 514       21,2112  0 4063 0            TC       BANKCALL          COMPENSATION IF IN COMPASS
 01215  REF    2 LAST 211       21,2113   16000 0            CADR     1/PIPA
 0122   REF    2 LAST 516       21,2114  0 2116 0            TC       NORMLOP


 0123   REF    1                21,2115  0 3070 0  ALFLT1    TC       LOADSTDT          COMES HERE ON RESTART

 0124   REF   51 LAST 514       21,2116  0 6000 1  NORMLOP   TC       INTPRET
 0125                           21,2117   77745 1            DLOAD
 0126   REF    2 LAST 514       21,2120   03351 0                     INTVAL
 0127   REF   16 LAST 491       21,2121   00051 0            STORE    S1                STEP REGISTERS MAY HAVE BEEN WIPED OUT
 0128                           21,2122   53135 0            SLOAD    BZE
 0129   REF    5 LAST 516       21,2123   01743 0                     GEOCOMPS
 0130   REF    1                21,2124   42127 0                     ALCGKK
 01301                          21,2125   77650 1            GOTO
 01302  REF    1                21,2126   42144 0                      ALFLT2
 0131                           21,2127   50135 0  ALCGKK    SLOAD    BMN
 0132   REF    2 LAST 515       21,2130   01666 0                     ALTIMS
 0133   REF    2 LAST 516       21,2131   42144 0                     ALFLT2
 0134                           21,2132   72174 0  ALKCG     AXT,2    LXA,1             LOADS SLOPES AND TIME CONSTANTS AT RQST
 0135                           21,2133   00014 1                     12D
 0136   REF    2 LAST 514       21,2134   01600 0                     ALX1S
 0137                           21,2135   62143 0  ALKCG2    DLOAD*   INCR,1
 0138   REF    1                21,2136   03343 0                     ALFDK +144D,1
 0139                           21,2137   77775 1            DEC      -2
 0140   REF    1                21,2140   05701 1            STORE    ALDK +10D,2
 0141                           21,2141   66104 1            TIX,2    SXA,1
 0142   REF    1                21,2142   42135 0                     ALKCG2
 0143   REF    3 LAST 516       21,2143   01600 0                     ALX1S

 0144                           21,2144   61375 1  ALFLT2    VLOAD    VXM
 0145   REF   12 LAST 515       21,2145   00404 1                     DELVX
 0146   REF    4 LAST 497       21,2146   01750 1                     GEOMTRX
 0147                           21,2147   77772 0            VSL1
 0149                           21,2150   57545 1            DLOAD    DCOMP
 0150   REF  572 LAST 509       21,2151   00144 0                     MPAC +3
 0151   REF    1                21,2152   07657 1            STODL    DPIPAY
 0152   REF  573 LAST 516       21,2153   00146 1                     MPAC +5
 0153   REF    1                21,2154   01663 0            STORE    DPIPAZ

 0154                           21,2155   76001 1            SETPD    AXT,1            MEASUREMENT INCORPORATION ROUTINES.
 0155                           21,2156   00001 0                     0
 0156                           21,2157   00010 0                     8D
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0157                      21,2160    53135 0              SLOAD   BZE
0158     REF   6 LAST 516 21,2161    01743 0                      GEOCOMPS
01581    REF   1          21,2162    42165 0                      DELMLP
01582                     21,2163    77650 1              GOTO
0159     REF   1          21,2164    42466 0                      ALWAYSG           DO A QUICK COMPASS
0160                      21,2165    41343 0  DELMLP      DLOAD*  DMP
0161     REF   2 LAST 516 21,2166    01667 1                      DPIPAY +8D,1
0162     REF   1          21,2167    03364 0                      PIPASC
0163                      21,2170    42661 0              SLR     DAD*
0164                      21,2171    01212 1                      9D
0165     REF   1          21,2172    01715 0                      DELM +8D,1
0166                      21,2173    64623 1              DSU*    PDDL*
0167     REF   3 LAST 376 21,2174    01635 0                      INTY +8D,1
0168     REF   4 LAST 376 21,2175    01655 0                      VLAUN +8D,1
0169                      21,2176    41223 1              DSU*    DMP
0170     REF   2 LAST  24 21,2177    01627 0                      VLAUNS +8D,1
0171     REF   1          21,2200    03366 1                      VELSC
0172                      21,2201    77732 1              SL2R
0173                      21,2202    45415 0              DAD     STADR
0174     REF   2 LAST 517 21,2203    74062 0              STORE   DELM +8D,1
0175     REF   3 LAST 517 21,2204    17717 0              STODL*  DELM +10D,1
0176     REF   5 LAST 517 21,2205    01655 0                      VLAUN +8D,1
0177     REF   3 LAST 517 21,2206    11627 1              STODL   VLAUNS +8D,1
0178     REF   3 LAST 516 21,2207    03347 1                      INTVAL -2
0179     REF   4 LAST 517 21,2210    03635 1              STORE   INTY +8D,1
0180                      21,2211    77100 0              TIX,1   AXT,2
0181     REF   2 LAST 517 21,2212    42165 0                      DELMLP
0182                      21,2213    00004 0                      4
0183                      21,2214    56743 1  ALILP       DLOAD*  DMPR*
0184     REF   1          21,2215    76170 0                      ALK +4,2
0185     REF   2 LAST 516 21,2216    76104 0                      ALDK +4,2
0186     REF   2 LAST 517 21,2217    05607 0              STORE   ALK +4,2
0187                      21,2220    77104 1              TIX,2   AXT,2
0188     REF   1          21,2221    42214 0                      ALILP
0189                      21,2222    00010 0                      8D
0190                      21,2223    66140 1  ALKLP       LXC,1   SXA,1
0191     REF   1          21,2224    01601 1                      CMPX1
0192     REF   2 LAST 517 21,2225    01601 1                      CMPX1
0193                      21,2226    56743 1              DLOAD*  DMPR*
0194     REF   3 LAST 517 21,2227    01604 1                      ALK +1,1
0195     REF   4 LAST 517 21,2230    76062 1                      DELM +8D,2
0196                      21,2231    77613 0              DAD*
0197     REF   5 LAST 517 21,2232    76142 1                      INTY +8D,2
0198     REF   6 LAST 517 21,2233    21635 1              STODL*  INTY +8D,2
0199     REF   4 LAST 517 21,2234    76160 1                      ALK +12D,2
0200                      21,2235    77613 0              DAD*
0201     REF   3 LAST 517 21,2236    76074 0                      ALDK +12D,2
0202     REF   5 LAST 517 21,2237    05617 1              STORE   ALK  +12D,2
0203                      21,2240    42673 0              DMPR*   DAD*
0204     REF   5 LAST 517 21,2241    76062 1                      DELM +8D,2
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L          OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                   USER'S OWN PAGE NO.   5

 0205    REF    7 LAST 517     21,2242    76132 0                    INTY  +16D,2
 0206    REF    8 LAST 518     21,2243    21645 0           STODL*   INTY  +16D,2
 0207    REF    1              21,2244    03371 1                    ALSK  +1,1
 0208                          21,2245    76403 1           DMP*     SL1R
 0209    REF    6 LAST 517     21,2246    76062 1                    DELM  +8D,2
 0210                          21,2247    77613 0           DAD*
 0211    REF    6 LAST 517     21,2250    76122 1                    VLAUN  +8D,2
 0212    REF    7 LAST 518     21,2251    05655 1           STORE    VLAUN  +8D,2
 0213                          21,2252    76104 0           TIX,2    AXT,1
 0214    REF    1              21,2253    42223 1                    ALKLP
 0215                          21,2254    00010 0                    8D


 0216                          21,2255    64743 0  LOOSE    DLOAD*   PDDL*
 0217    REF    2 LAST  24     21,2256    01657 1                    ACCWD  +8D,1
 0218    REF    8 LAST 518     21,2257    01655 0                    VLAUN  +8D,1
 0219                          21,2260    55523 0           PDDL*    VDEF
 0220    REF    1              21,2261    01665 0                    POSNV  +8D,1
 0221                          21,2262    76521 0           MXV      VSL1
 0222    REF    4 LAST 476     21,2263    01721 1                    TRANSM1
 0223                          21,2264    77745 1           DLOAD
 0224    REF 574 LAST 516      21,2265    00141 0                    MPAC
 0225    REF    2 LAST 518     21,2266    11665 1           STODL    POSNV  +8D,1
 0226    REF 575 LAST 518      21,2267    00144 0                    MPAC  +3
 0227    REF    9 LAST 518     21,2270    11655 1           STODL    VLAUN  +8D,1
 0228    REF 576 LAST 518      21,2271    00146 1                    MPAC  +5
 0229    REF    3 LAST 518     21,2272    03657 0           STORE    ACCWD  +8D,1
 0230                          21,2273    77700 0           TIX,1
 0231    REF    1              21,2274    42255 0                    LOOSE


 0232                          21,2275    76174 1           AXT,2    AXT,1                  EVALUATE SINES AND COSINES
 0233                          21,2276    00006 1                    6
 0234                          21,2277    00002 0                    2
 0235                          21,2300    57343 1  BOOP     DLOAD*   DMPR
 0236    REF    2 LAST 376     21,2301    01637 1                    ANGX  +2,1
 0237    REF    1              21,2302    03374 1                    GEORGEJ
 0238                          21,2303    77722 0           SR2R
 0239                          21,2304    73406 1           PUSH     SIN
 0240                          21,2305    56172 0           SL1R     XAD,1
 0241    REF   10 LAST 429     21,2306    00046 0                    X1
 0242                          21,2307    12021 1           STODL    16D,2
 0243                          21,2310    77746 1           COS
 0244                          21,2311    04027 0           STORE    22D,2                  COSINES
 0245                          21,2312    71304 0           TIX,2    DLOAD
 0246    REF    1              21,2313    42300 1                    BOOP
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L       OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                              USER'S OWN PAGE NO.   6

 0247                         21,2314    00017 1               14D
 0248                         21,2315    43312 0         SL2   DAD
 0249   REF    9 LAST 518     21,2316    01625 1               INTY
 0250   REF   10 LAST 519     21,2317    07625 1         STODL INTY
 0251                         21,2320    00015 0               12D
 0252                         21,2321    56405 0         DMP   SL3R
 0253                         21,2322    00025 0               20D
 0254                         21,2323    77615 0         DAD
 0255   REF    1              21,2324    01631 1               INTZ
 0256   REF    2 LAST 519     21,2325    07631 1         STODL INTZ
 0257                         21,2326    00021 1               16D
 0258                         21,2327    57275 0         DMPR  DMPR
 0259                         21,2330    00023 0               18D
 0260                         21,2331    00017 1               14D
 0261                         21,2332    77712 0         SL2
 0262                         21,2333    57325 1         PDDL  DMPR
 0263                         21,2334    00013 0               10D
 0264                         21,2335    00015 0               12D
 0265                         21,2336    77615 0         DAD
 0266                         21,2337    77675 0         DMPR
 0267   REF    2 LAST 476     21,2340    01573 1               WANGI
 0268                         21,2341    57325 1         PDDL  DMPR
 0269                         21,2342    00023 0               18D
 0270                         21,2343    00025 0               20D
 0271                         21,2344    66405 0         DMP   SL2R
 0272   REF    2 LAST 476     21,2345    01571 0               WANGO
 0273                         21,2346    77621 1         BDSU
 0274   REF    3 LAST 478     21,2347    01637 1               DRIFTO
 0275                         21,2350    45425 0         DSU   STADR
 0276   REF    1              21,2351    70156 1         STODL WPLATO
 0277                         21,2352    00021 1               16D
 0278                         21,2353    41275 1         DMPR  DMP
 0279                         21,2354    00025 0               20D
 0280   REF    3 LAST 519     21,2355    01573 1               WANGI
 0281                         21,2356    77732 1         SL2R
 0282                         21,2357    57325 1         PDDL  DMPR
 0283   REF    3 LAST 519     21,2360    01571 0               WANGO
 0284                         21,2361    00017 1               14D
 0285                         21,2362    77615 0         DAD
 0286   REF    3 LAST 476     21,2363    01641 0               DRIFTI
 0287                         21,2364    77625 0         DSU
 0288                         21,2365    57325 1         PDDL  DMPR
 0289   REF    2 LAST  24     21,2366    01575 1               WANGT
 0290   REF    4 LAST 519     21,2367    01573 1               WANGI
 0291                         21,2370    45415 0         DAD   STADR
 0292   REF    1              21,2371    70062 1         STODL WPLATI
 0293                         21,2372    00023 0               18D
 0294                         21,2373    76405 1         DMP   SL1R
 0295                         21,2374    00013 0               10D
 0296                         21,2375    57325 1         PDDL  DMPR
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0297                       21,2376   00015 0            12D
0298                       21,2377   00021 1            16D
0299                       21,2400   76405 1   DMP      SL1R
0300                       21,2401   00017 1            14D
0301                       21,2402   77621 1   BDSU
0302                       21,2403   77675 0   DMPR
0303  REF   5 LAST 519     21,2404   01573 1            WANGI
0304                       21,2405   57325 1   PDDL     DMPR
0305                       21,2406   00015 0            12D
0306                       21,2407   00025 0            20D
0307                       21,2410   76405 1   DMP      SL1R
0308  REF   4 LAST 519     21,2411   01571 0            WANGO
0309                       21,2412   77621 1   BDSU
0310  REF   5 LAST 494     21,2413   01577 0            DRIFTT
0311                       21,2414   77615 0   DAD                    WPLATT NOW IN MPAC
0312                       21,2415   77606 1   PUSH                  PUSH IT DOWN-X IT BY SANG +2
0313                       21,2416   74475 1   DMPR     SR1R
0314                       21,2417   00015 0            12D
0315                       21,2420   57325 1   PDDL     DMPR
0316  REF   2 LAST 519     21,2421   01621 0            WPLATO
0317                       21,2422   00023 0            18D
0318                       21,2423   77615 0   DAD
0319                       21,2424   77671 1   DDV
0320                       21,2425   00025 0            20D
0321                       21,2426   57206 1   PUSH     DMPR
0322  REF   1              21,2427   03376 0            GEORGEK
0323                       21,2430   43261 0   SRR      DAD
0324                       21,2431   01616 1            13D
0325  REF   3 LAST 518     21,2432   01635 0            ANGX
0326  REF   4 LAST 520     21,2433   07635 0   STODL    ANGX
0327                       21,2434   43275 0   DMPR     DAD
0328                       21,2435   00017 1            14D
0329  REF   2 LAST 519     21,2436   01715 0            WPLATI
0330                       21,2437   54275 0   DMPR     SRR
0331  REF   2 LAST 520     21,2440   03376 0            GEORGEK
0332                       21,2441   01616 1            13D
0333                       21,2442   77615 0   DAD
0334  REF   2 LAST 376     21,2443   01633 0            ANGY
0335  REF   3 LAST 520     21,2444   07633 0   STODL    ANGY
0336                       21,2445   00023 0            18D
0337                       21,2446   76405 1   DMP      SL1R          MULTIPLY X WPLATT -SL1- PUSH AND RELOAD
0338                       21,2447   57325 1   PDDL     DMPR
0339                       21,2450   00015 0            12D
0340  REF   3 LAST 520     21,2451   01621 0            WPLATO
0341                       21,2452   77621 1   BDSU
0342                       21,2453   54275 0   DMPR     SRR
0343  REF   3 LAST 520     21,2454   03376 0            GEORGEK
0344                       21,2455   01616 1            13D
0345                       21,2456   77615 0   DAD
0346  REF   2 LAST 376     21,2457   01627 0            ANGZ
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L       OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                      USER'S OWN PAGE NO.   8

 0347   REF   3 LAST 520    21,2460   01627 0             STORE  ANGZ
 0348                       21,2461   77404 1             BOVB   EXIT
 0349   REF   1             21,2462   42716 1                    SOMEERRR
 0350   REF  10 LAST 514    21,2463  11,527 1             CCS    LENGTHOT
 03501  REF   2 LAST 514    21,2464  0 2666 0             TC     SLEEPIE
 03502  REF   1             21,2465  0 2631 1             TC     SETUPER1



 0351                       21,2466   44743 1  ALWAYSG  DLOAD* DSU*                   COMPASS AND ERECT
 0352   REF   3 LAST 517    21,2467   01667 1                    DPIPAY +8D,1
 0353   REF   1             21,2470   01655 0                    FILDELV +8D,1
 0354                       21,2471   42675 0           DMPR   DAD*
 0355   REF   1             21,2472   03400 0                    GEOCONS1
 0356   REF   2 LAST 521    21,2473   01655 0                    FILDELV +8D,1
 0357   REF   3 LAST 521    21,2474   03655 1           STORE  FILDELV +8D,1
 0358                       21,2475   77613 0           DAD*
 0359   REF   1             21,2476   01657 1                    INTVEC +8D,1
 0360   REF   2 LAST 521    21,2477   03657 0           STORE  INTVEC +8D,1
 0361                       21,2500   42675 0           DMPR   DAD*
 0362   REF   1             21,2501   03402 1                    GEOCONS2
 0363   REF   4 LAST 521    21,2502   01655 0                    FILDELV +8D,1
 0364                       21,2503   41475 1           DMPR   PUSH
 0365   REF   2 LAST 521    21,2504   03400 0                    GEOCONS1
 0366                       21,2505   67300 0           TIX,1  SLOAD
 0367   REF   2 LAST 517    21,2506   42466 0                    ALWAYSG
 0368   REF   2 LAST 514    21,2507   01747 1                    ERECTIME
 0369                       21,2510   71254 1           BZE    DLOAD
 0370   REF   1             21,2511   42522 1                    COMPGS                 COMPASS
 0371   REF   1             21,2512   01627 0                    THETAN +2
 0372                       21,2513   45425 0           DSU    STADR
 0373   REF   2 LAST 521    21,2514   70150 1           STODL  THETAN +2
 0374                       21,2515   77621 1           BDSU
 0375   REF   3 LAST 521    21,2516   01631 1                    THETAN +4
 0376   REF   4 LAST 521    21,2517   01631 1           STORE  THETAN +4
 0377                       21,2520   77650 1           GOTO
 0378   REF   1             21,2521   42544 1                    ADDINDRF
 0379                       21,2522   43345 1  COMPGS   DLOAD  DAD                    COMPASS
 0380   REF   5 LAST 521    21,2523   01625 1                    THETAN
 0381   REF   5 LAST 521    21,2524   01645 1                    FILDELV
 0382   REF   6 LAST 521    21,2525   07625 1           STODL  THETAN
 0383   REF   6 LAST 521    21,2526   01645 1                    FILDELV
 0384                       21,2527   44275 1           DMPR   BDSU
 0385   REF   1             21,2530   03404 1                    GEOCONS3
 0386   REF   7 LAST 521    21,2531   01631 1                    THETAN +4
 0387   REF   8 LAST 521    21,2532   07631 1           STODL  THETAN +4
 0388   REF   7 LAST 521    21,2533   01651 1                    FILDELV +4
 0389                       21,2534   44275 1           DMPR   BDSU
 0390   REF   2 LAST 521    21,2535   03404 1                    GEOCONS3
 0391   REF   9 LAST 521    21,2536   01627 0                    THETAN +2
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L        OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                                USER'S OWN PAGE NO.   9

 0392                        21,2537   41325 0           PDDL     DMP
 0393    REF    3 LAST 521   21,2540   01653 0                    INTVEC +4
 0394    REF    1            21,2541   03406 0                    GEOCONS4
 0395                        21,2542   45421 1           BDSU     STADR
 0396    REF   10 LAST 521   21,2543   76150 1           STORE    THETAN +2
 0397                        21,2544   64375 1 ADDINDRF  VLOAD    MXV
 0398    REF   11 LAST 522   21,2545   01625 1                    THETAN
 0399    REF    5 LAST 516   21,2546   01750 1                    GEOMTRX
 0400                        21,2547   53372 1           VSL1     VAD
 0401    REF    1            21,2550   01617 0                    THETAX
 0402    REF    2 LAST 522   21,2551   01617 0           STORE    THETAX
 0403                        21,2552   77776 1           EXIT


 0404    REF   11 LAST 521   21,2553  11'527 1 ENDGTSAL  CCS      LENGTHOT               IS 5 SEC OVER-THE TIME TO TORQ PLATFORM
 0405    REF    3 LAST 521   21,2554  0 2666 0           TC       SLEEPIE                NO-SET UP NEXT WAITLIST CALL FOR .5 SEC
 0406    REF   14 LAST 486   21,2555  10 357 1           CCS      LGYRO                  YES BUT ARE GYROS BUSY
 0407    REF    2 LAST 514   21,2556  1 2742 0           TCF      ANNNNNN +2             BUSY-GET THEM .5 SECONDS FROM NOW


 0410    REF    7 LAST 516   21,2557  0 4614 0           TC       PHASCHNG
 0411                        21,2560   00401 1           OCT      00401
 0415    REF   52 LAST 516   21,2561  0 6000 1           TC       INTPRET                ADD COMPASS COMMANDS INTO ERATE
 0416                        21,2562   53375 0           VLOAD    VAD
 0417    REF    3 LAST 522   21,2563   01617 0                    THETAX
 0418    REF    6 LAST 459   21,2564   01772 1                    ERCOMP
 0419    REF    7 LAST 522   21,2565   01772 1           STORE    ERCOMP
 0420                        21,2566   77776 1           EXIT
 0421    REF  108 LAST 516   21,2567  0 4063 0           TC       BANKCALL
 0422    REF    7 LAST 483   21,2570   30422 0           CADR     EARTHR                 TORQUE IT ALL IN


 0423                        21,2571  0 0004 0 RESTEST1  INHINT                          CHECK ON ORIENTATION CHANGE
 0424    REF    1            21,2572  3 1717 1           CA       PREMTRXC
 0430                        21,2573  0 0006 1           EXTEND
 0431    REF    1            21,2574  6 2727 1           BZMF     NOCHORLD               +1 -CHANGE, 0 OR -1 NO LOAD OR LOADING
 0432    REF    2 LAST 496   21,2575  0 3107 1           TC       LOADXSM                IF THERE WAS A CHANGE LOAD IT INTO XSM
 04321   REF    8 LAST 522   21,2576  0 4614 0           TC       PHASCHNG
 04322                       21,2577   01001 1           OCT      01001
 04323   REF  193 LAST 515   21,2600  3 7665 0 RESTEST3  CA       ZERO                   RESET CHANGE INDEX TO ZERO
 0434    REF    2 LAST 522   21,2601  55'717 0           TS       PREMTRXC
 0435                        21,2602  0 0003 1           RELINT
 0436   REF  53 LAST 522    21,2603  0 6000 1             TC       INTPRET             HERE TO CHANGE ORIENTATOON
 0437                       21,2604   77770 1             AXT,1                        DESIRED IN XSM,PRESENT IN GEOMTRX
 0438                       21,2605   00022 1                      18D
 0439                       21,2606   77731 1             SSP
 0440   REF  17 LAST 516    21,2607   00051 0                      S1
 0441                       21,2610   00006 1                      6
 0442                       21,2611   50373 0  LOADM      VLOAD*   DOT
 0443   REF  46 LAST 514    21,2612   01423 0                      XSM +18D,1
 0444   REF   6 LAST 522    21,2613   01764 0                      GEOMTRX +12D
 0445                       21,2614   50313 0             PDVL*    DOT
 0446   REF  47 LAST 523    21,2615   01423 0                      XSM +18D,1
 0447   REF   7 LAST 523    21,2616   01756 1                      GEOMTRX +6D
 0448                       21,2617   50313 0             PDVL*    DOT
 0449   REF  48 LAST 523    21,2620   01423 0                      XSM +18D,1
 0450   REF   8 LAST 523    21,2621   01750 1                      GEOMTRX
 0451                       21,2622   53466 0             VDEF     UNIT
 0452   REF  17 LAST 490    21,2623   03445 1             STORE    XDC +18D,1
 0453                       21,2624   47100 0             TIX,1    CALL
 0454   REF   1             21,2625   42611 1                      LOADM
 0455   REF   3 LAST 490    21,2626   32367 1                      CALCGTA
 0456                       21,2627   77776 1             EXIT
 0457   REF   1             21,2630  0 2645 1             TC       TORQINCH            NECESSARY TORQUE NOW IN OGC


 0458   REF  54 LAST 523    21,2631  0 6000 1  SETUPER1   TC       INTPRET
 0459                       21,2632   65345 0             DLOAD    PDDL                ANGLES FROM DRIFT TEST ONLY
 0460   REF   4 LAST 521    21,2633   01627 0                      ANGZ
 0461   REF   4 LAST 520    21,2634   01633 0                      ANGY
 0462                       21,2635   55525 0             PDDL     VDEF
 0463   REF   5 LAST 520    21,2636   01635 0                      ANGX
 0464                       21,2637   74276 1             VCOMP    VXSC
 0465   REF   2 LAST 518    21,2640   03374 1                      GEORGEJ
 0466                       21,2641   74521 1             MXV      VSR1
 0467   REF   9 LAST 523    21,2642   01750 1                      GEOMTRX
 0468   REF  10 LAST 513    21,2643   01501 1             STORE    OGC
 0469                       21,2644   77776 1             EXIT


 0470   REF   9 LAST 522    21,2645  0 4614 0  TORQINCH   TC       PHASCHNG
 0471                       21,2646   00501 0             OCT      00501
 0472   REF   1             21,2647  3 3362 0             CA       AINGYRO
 0473   REF 109 LAST 522    21,2650  0 4063 0             TC       BANKCALL
 0474   REF   5 LAST 490    21,2651   26317 0             CADR     IMUPULSE
 0475   REF 110 LAST 523    21,2652  0 4063 0             TC       BANKCALL
 0476   REF  30 LAST 511    21,2653   26716 0             CADR     IMUSTALL
 0477   REF   1             21,2654  0 2721 1             TC       SOMERR2             BAD GYRO TORQUE-END OF TEST
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0478   REF   5 LAST 478     21,2655  11'574 1  GEOSTRT4 CCS     TORQNDX         ONLY POSITIVE IF IN VERTICAL DRIFT TEST
0479   REF   1              21,2656   0 2664 1           TC      GEOBAVR        VERT DRIFT TEST OVER
0480   REF   2 LAST 514     21,2657   0 2753 1           TC      SETUPER         SET UP ERATE FOR PIPTEST OR COMPASS
0481   REF   7 LAST 517     21,2660  11'742 0            CCS     GEOCOMPS
0482   REF   1              21,2661   0 2725 0           TC      TQORESTM
0483   REF 111 LAST 523     21,2662   0 4063 0           TC      BANKCALL       GO TO IMU2 FOR A PIPA TEST AND DISPLAY
0484   REF   1              21,2663    36075 0           CADR    TORQUE

0485   REF 112 LAST 524     21,2664   0 4063 0  GEOBAVR  TC      BANKCALL
0486   REF   1              21,2665    36223 1           CADR    VALMIS          DISPLAY VERTICAL DRIFT
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R04861  SET UP WAITLIST SECTION
 0487   REF  12 LAST 522     21,2666  55'527 1  SLEEPIE  TS      LENGTHOT       TEST NOT OVER-DECREMENT LENGTHOT
 0488   REF  10 LAST 523     21,2667  0 4614 0           TC      PHASCHNG        CHANGE PHASE
 0489                        21,2670   00301 0           OCT     00301
 0490   REF   6 LAST 524     21,2671  11'574 1           CCS     TORQNDX        ARE WE DOING VERTDRIFT
 0491   REF   1              21,2672  0 2674 0           TC      EARTTPRQ       YES,DO HOR ERATE TORQ THEN SLEEP
 0492   REF   1              21,2673  0 2676 1           TC      WTLISTNT       GO TO SET UP NEXT WAITLIST
 0493   REF 113 LAST 524     21,2674  0 4063 0  EARTTPRQ TC      BANKCALL       IN VERTDRIFT,ADD HOR ERATE AND SLEEP
 0494   REF   8 LAST 522     21,2675   30422 0           CADR    EARTHR
 0495                        21,2676  0 0004 0  WTLISTNT INHINT
 0496   REF  10 LAST 515     21,2677  4 0025 1           CS      TIME1
 0497   REF   3 LAST 515     21,2700  6 1745 0           AD      GTSWTLST
 0498                        21,2701  0 0006 1           EXTEND
 0499                        21,2702  6 2704 0           BZMF    +2
 0500   REF   4 LAST 182     21,2703  6 7641 0           AD      NEGMAX
 0501   REF   2 LAST 475     21,2704  6 1744 1           AD      1SECXT         1 SEC FOR CALIBRATION,.5 SEC IN COMPASS
 0502                        21,2705  0 0006 1           EXTEND
 0503   REF   1              21,2706  6 2714 1           BZMF    RIGHTGTS
 0504   REF  74 LAST 512     21,2707  0 4536 0  WTGTSMPL TC      WAITLIST
 0505                        21,2710   02042 0           2CADR   ALLOOP
C0505   REF   1              21,2711   42005 1
 0506                        21,2712  0 0003 1           RELINT
 0507   REF  55 LAST 462     21,2713  0 4440 0           TC      ENDOFJOB
 0508   REF  75 LAST 510     21,2714  3 7656 0  RIGHTGTS CAF     TWO
 0509   REF   1              21,2715  0 2707 0           TC      WTGTSMPL


 0510   REF  30 LAST 481     21,2716  0 5413 1  SOMEERRR TC      ALARM
 0511                        21,2717   01600 0           OCT     1600
 0512                        21,2720  0 2723 0           TC      +3
 0513   REF  31 LAST 525     21,2721  0 5413 1  SOMERR2  TC      ALARM
 0514                        21,2722   01601 1           OCT     1601
 0515   REF 114 LAST 525     21,2723  0 4063 0           TC      BANKCALL
 0516   REF  26 LAST 504     21,2724   30745 1           CADR    ENDTEST
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0517    REF 115 LAST 525   21,2725  0 4063 0  TQORESTM TC       BANKCALL
0518    REF   3 LAST 477   21,2726   37612 0           CADR     LOADGTSM         LOAD NEW XSM MATRIX INTO GEOMTRX

0520                       21,2727  0 0003 1  NOCHORLD RELINT                    AFTER CHANGEIN ORIEN OR NO CHANGE
0521    REF  55 LAST 523   21,2730  0 6000 1           TC       INTPRET
0522                       21,2731   77775 1           VLOAD
0523    REF   1            21,2732   03343 0                    SCHZEROS
0524    REF   4 LAST 522   21,2733   01617 0           STORE    THETAX
0525    REF  12 LAST 522   21,2734   01625 1           STORE    THETAN
0526                       21,2735   77776 1           EXIT
0527    REF   3 LAST 521   21,2736  11'746 1           CCS      ERECTIME
0528    REF   4 LAST 526   21,2737  55'746 1           TS       ERECTIME                  COUNTS DOWN FOR ERECTION

0529    REF   2 LAST 472   21,2740  3 7662 1  ANNNNNN  CAF      NINE
0530    REF  13 LAST 525   21,2741  55'527 1           TS       LENGTHOT
0531    REF   5 LAST 526   21,2742  11'746 1           CCS      ERECTIME
0532    REF   4 LAST 522   21,2743  0 2667 1           TC       SLEEPIE +1
05321   REF   1            21,2744  0 4702 0           TC       CHECKMM          IN COMPASS CHECK FOR VERIFICATION
05322                      21,2745   00003 1           OCT      03
05323                      21,2746  0 2750 1           TC       +2               NOT VERIFYING
05324   REF   5 LAST 526   21,2747  0 2667 1           TC       SLEEPIE +1       YES
0533    REF   6 LAST 514   21,2750  0 4667 1           TC       NEWMODEX
0534                       21,2751   00002 0           OCT      02
0535    REF   6 LAST 526   21,2752  0 2667 1           TC       SLEEPIE +1       COMPASS IS 02  -ERECTION 05
0536                       21,2753  0 0006 1  SETUPER  EXTEND                    SUBROUTINE CALLED IN 3 PLACES
0537    REF   3 LAST 453   21,2754  23'547 0           QXCH     QPLACES
0538    REF  56 LAST 526   21,2755  0 6000 1           TC       INTPRET
0539                       21,2756   77634 0           CALL
0540    REF   3 LAST 474   21,2757   30405 0                    ERTHRVSE
0541                       21,2760   77776 1           EXIT
0542    REF 116 LAST 526   21,2761  0 4063 0           TC       BANKCALL
0543    REF   3 LAST 474   21,2762   30727 0           CADR     OGCZERO
0544    REF   4 LAST 526   21,2763  0 1547 0           TC       QPLACES
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 0546    REF   2 LAST 151     21,2764  51'074 0  OPTMSTRT INDEX    PHASE1
 0547                         21,2765  0 2765 1           TC       +0
 0548    REF   1              21,2766  0 2776 0           TC       GTSGTS1
 0549    REF   1              21,2767  0 3003 1           TC       GTSGTS2
 0550    REF   1              21,2770  0 3010 0           TC       GTSGTS3
 0551    REF   1              21,2771  0 3015 0           TC       GTSGTS4
 0552    REF   1              21,2772  0 3022 1           TC       GTSGTS5
 0553    REF   1              21,2773  0 3027 1           TC       GTSGTS6
 05531   REF   1              21,2774  0 3034 0           TC       GTSGTS7
 055311  REF   1              21,2775  0 3040 0           TC       GTSGTS10


 0554    REF   6 LAST 515     21,2776  3 7642 0  GTSGTS1  CAF      PRIO20
 0555    REF   8 LAST 515     21,2777  0 4374 0           TC       FINDVAC
 0556                         21,3000   02002 1           2CADR    RSTGTS1
C0556    REF   1              21,3001   42005 1
 0557    REF   7 LAST 236     21,3002  0 4076 1           TC       SWRETURN
 0558    REF 133 LAST 504     21,3003  3 7657 1  GTSGTS2  CAF      ONE
 0559    REF  75 LAST 525     21,3004  0 4536 0           TC       WAITLIST
 0560                         21,3005   02052 1           2CADR    ALLOOP1
C0560    REF   1              21,3006   42005 1
 0561    REF   8 LAST 527     21,3007  0 4076 1           TC       SWRETURN
 0562    REF   7 LAST 527     21,3010  3 7642 0  GTSGTS3  CAF      PRIO20
 0563    REF   9 LAST 527     21,3011  0 4374 0           TC       FINDVAC
 0564                         21,3012   02676 1           2CADR    WTLISTNT
C0564    REF   2 LAST 525     21,3013   42005 1
 0565    REF   9 LAST 527     21,3014  0 4076 1           TC       SWRETURN
 0566    REF   8 LAST 527     21,3015  3 7642 0  GTSGTS4  CAF      PRIO20
 0567    REF  10 LAST 527     21,3016  0 4374 0           TC       FINDVAC
 0568                         21,3017   02571 0           2CADR    RESTEST1
C0568    REF   1              21,3020   42005 1
 0569    REF  10 LAST 527     21,3021  0 4076 1           TC       SWRETURN
 0570    REF   9 LAST 527     21,3022  3 7642 0  GTSGTS5  CAF      PRIO20
 0571    REF  11 LAST 527     21,3023  0 4374 0           TC       FINDVAC
 0572                         21,3024   02655 0           2CADR    GEOSTRT4
C0572    REF   1              21,3025   42005 1
 0573    REF  11 LAST 527     21,3026  0 4076 1           TC       SWRETURN
 0574    REF  10 LAST 527     21,3027  3 7642 0  GTSGTS6  CAF      PRIO20
 0575    REF  12 LAST 527     21,3030  0 4374 0           TC       FINDVAC
 0576                         21,3031   02115 0           2CADR    ALFLT1
C0576    REF   1              21,3032   42005 1
 0577    REF  12 LAST 527     21,3033  0 4076 1           TC       SWRETURN

 05771   REF 134 LAST 527     21,3034  3 7657 1  GTSGTS7  CAF      ONE
 05772   REF  76 LAST 527     21,3035  0 4536 0           TC       WAITLIST
 05773                        21,3036   02077 0           2CADR    SPECSTS
C05773   REF   1              21,3037   42005 1
 05775   REF  11 LAST 527     21,3040  3 7642 0  GTSGTS10 CAF      PRIO20
 05776   REF  13 LAST 527     21,3041  0 4374 0           TC       FINDVAC
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L       OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                              USER'S OWN PAGE NO.  15

 05777                                21,3042   02600 0         2CADR   RESTEST3
C05777  REF    1                      21,3043   42005 1
 05778  REF   13 LAST 527             21,3044  0 4076 1         TC      SWRETURN
 0578                          21,3045   02000 0  GEOBND    OCT     02000              BANK 4  -THIS IS THE STORE DTA SECTION
 0579                          21,3046   02400 1  GEOBND1   OCT     02400             BANK NUMBER 5



 0581    REF   1               21,3047   3 3045 0  STOREDTA CAF     GEOBND
 0582    REF 173 LAST 506      21,3050   54 001 1           TS      L
 0583    REF   2 LAST 514      21,3051   3 3360 1           CAF     77DECML
 0584    REF 577 LAST 518      21,3052   54 140 0           TS      MPAC
 0585    REF 578 LAST 529      21,3053   50 140 1           INDEX   MPAC
 0586    REF   4 LAST 516      21,3054   3 1600 0           CA      ALX1S
 0587    REF  27 LAST 471      21,3055   22 003 1           LXCH    EBANK
 0588    REF  23 LAST 434                     E4            EBANK=  JETSTEP
 0589    REF 579 LAST 529      21,3056   50 140 1           INDEX   MPAC
 0590    REF  24 LAST 529      21,3057   55'407 1           TS      JETSTEP
 0591    REF  28 LAST 529      21,3060   22 003 1           LXCH    EBANK
 0592    REF  49 LAST 523                     E5            EBANK=  XSM
 0593    REF 580 LAST 529      21,3061   10 140 0           CCS     MPAC
 0594                          21,3062   1 3064 1           TCF     +2
 0595    REF 279 LAST 509      21,3063   0 0002 0           TC      Q
 0596    REF 581 LAST 529      21,3064   54 140 0           TS      MPAC
 0597    REF   2 LAST 529      21,3065   3 3045 0           CAF     GEOBND
 0598    REF 174 LAST 529      21,3066   54 001 1           TS      L
 0599    REF   2 LAST 516      21,3067   1 3053 0           TCF     STOREDTA +4



 0600    REF   3 LAST 529      21,3070   3 3360 1  LOADSTDT CAF     77DECML
 0601    REF 582 LAST 529      21,3071   54 140 0           TS      MPAC
 0602    REF   3 LAST 529      21,3072   3 3045 0           CA      GEOBND
 0603    REF  29 LAST 529      21,3073   56 003 1           XCH     EBANK
 0604    REF 175 LAST 529      21,3074   54 001 1           TS      L
 0605    REF  25 LAST 529                     E4            EBANK=  JETSTEP
 0606    REF 583 LAST 529      21,3075   50 140 1           INDEX   MPAC
 0607    REF  26 LAST 529      21,3076   3 1407 0           CA      JETSTEP
 0608    REF  30 LAST 529      21,3077   22 003 1           LXCH    EBANK
 0609    REF  50 LAST 529                     E5            EBANK=  XSM
 0610    REF 584 LAST 529      21,3100   50 140 1           INDEX   MPAC
 0611    REF   5 LAST 529      21,3101   55'600 1           TS      ALX1S
 0612    REF 585 LAST 529      21,3102   10 140 0           CCS     MPAC
 0613                          21,3103   1 3105 1           TCF     +2
 0614    REF 280 LAST 529      21,3104   0 0002 0           TC      Q
 0615    REF 586 LAST 529      21,3105   54 140 0           TS      MPAC
 0616    REF   2 LAST 516      21,3106   1 3072 0           TCF     LOADSTDT +2
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  0617                           21,3107  0 0006 1  LOADXSM  EXTEND
  0618  REF    5 LAST 526        21,3110  23'547 0           QXCH    QPLACES
  0619  REF    1                 21,3111  3 3410 1           CAF     17DECML
  0620  REF 587 LAST 529         21,3112  54 140 0           TS      MPAC
  0621  REF 334 LAST 515         21,3113  50 000 1           INDEX   A
  0622  REF    2 LAST  24        21,3114  3 1720 0           CA      PRELMTRX
  0623  REF 588 LAST 530         21,3115  50 140 1           INDEX   MPAC
  0624  REF   51 LAST 529        21,3116  55'400 0           TS      XSM
  0625  REF 589 LAST 530         21,3117  10 140 0           CCS     MPAC
  0626  REF    3 LAST 522        21,3120  1 3112 1           TCF     LOADXSM +3
  0627  REF    6 LAST 530        21,3121  0 1547 0           TC      QPLACES
  0628                           21,3122   77743 1  ALFDK    DEC     -28          SLOPES AND TIME CONSTANTS FOR FIRST 30SC
  0629                           21,3123   77776 1           DEC     -1
  0630                           21,3124   35143 1           2DEC    .91230833    TIME CONSTANTS-PIPA OUTPUTS
 C0630                           21,3125   10237 0
  0631                           21,3126   31766 1           2DEC    .81193187    TIME CONSTANT-ERECTION ANGLES
 C0631                           21,3127   26106 1
  0632                           21,3130   77772 0           2DEC    -.00035882   SLOPE-AZIMUTH ANGLE
 C0632                           21,3131   43677 0
  0633                           21,3132   77777 0           2DEC    -.00000029   SLOPE-VERTICAL DRIFT
 C0633                           21,3133   77661 0
  0634                           21,3134   00002 0           2DEC    .00013262    SLOPE-NORTH SOUTH DRIFT
 C0634                           21,3135   05420 1

  0635                           21,3136   77705 0           DEC     -58          31-90 SEC
  0636                           21,3137   77776 1           DEC     -1
  0637                           21,3140   37560 0           2DEC    .99122133
 C0637                           21,3141   05346 0
  0638                           21,3142   37522 0           2DEC    .98940595
 C0638                           21,3143   15525 1
  0639                           21,3144   77763 0           2DEC    -.00079010
 C0639                           21,3145   41604 0
  0640                           21,3146   77777 0           2DEC    -.00000265
 C0640                           21,3147   76470 0
  0641                           21,3150   00007 0           2DEC    .00043154
 C0641                           21,3151   02201 0

  0642                           21,3152   77767 1           DEC     -8           91-100 SEC
  0643                           21,3153   77776 1           DEC     -1
  0644                           21,3154   37773 0           2DEC    .99971021
 C0644                           21,3155   10042 0
  0645                           21,3156   37747 1           2DEC    .99852047
 C0645                           21,3157   30232 1
  0646                           21,3160   00006 1           2DEC    .00042697
 C0646                           21,3161   37666 0
  0647                           21,3162   77777 0           2DEC    -.00000213
 C0647                           21,3163   76703 1
  0648                           21,3164   00001 0           2DEC    .00011864
 C0648                           21,3165   36147 0
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L        OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                              USER'S OWN PAGE NO.  18

  0649                            21,3166   77635 1           DEC     -98            101-200 SEC
  0650                            21,3167   77776 1           DEC     -1
  0651                            21,3170   37666 0           2DEC    .99550063
 C0651                            21,3171   11022 1
  0652                            21,3172   37532 1           2DEC    .98992124
 C0652                            21,3173   33647 1
  0653                            21,3174   00007 0           2DEC    .00043452
 C0653                            21,3175   03641 1
  0654                            21,3176   77777 0           2DEC    -.00000401
 C0654                            21,3177   75713 0
  0655                            21,3200   77774 0           2DEC    -.00021980
 C0655                            21,3201   54605 0

  0656                            21,3202   77407 1           DEC     -248           201-450 SEC
  0657                            21,3203   77776 1           DEC     -1
  0658                            21,3204   37712 1           2DEC    .99673264
 C0658                            21,3205   16755 1
  0659                            21,3206   37630 0           2DEC    .99365467
 C0659                            21,3207   01160 1
  0660                            21,3210   00000 1           2DEC    .00003767
 C0660                            21,3211   23600 0
  0661                            21,3212   77777 0           2DEC    -.00002317
 C0661                            21,3213   63663 1
  0662                            21,3214   77777 0           2DEC    -.00003305
 C0662                            21,3215   56527 1

  0663                            21,3216   77255 0           DEC     -338           451-790 SEC
  0664                            21,3217   77776 1           DEC     -1
  0665                            21,3220   37763 1           2DEC    .99924362
 C0665                            21,3221   23341 0
  0666                            21,3222   37755 1           2DEC    .99888274
 C0666                            21,3223   26170 0
  0667                            21,3224   00000 1           2DEC    .00000064
 C0667                            21,3225   00254 1
  0668                            21,3226   77777 0           2DEC    -.00004012
 C0668                            21,3227   52755 1
  0669                            21,3230   77777 0           2DEC    -.00000195
 C0669                            21,3231   76764 0

  0670                            21,3232   77147 0           DEC     -408           791-1200 SEC
  0671                            21,3233   77776 1           DEC     -1
  0672                            21,3234   37772 1           2DEC    .99963845
 C0672                            21,3235   02343 1
  0673                            21,3236   37761 0           2DEC    .99913162
 C0673                            21,3237   30560 1
  0674                            21,3240   00000 1           2DEC    .00000090
 C0674                            21,3241   00362 0
 0675                   21,3242   00000 1          2DEC    .00002927
C0675                   21,3243   17261 1
 0676                   21,3244   77777 0          2DEC    -.00000026
C0676                   21,3245   77671 1

 0677                   21,3246   77015 0          DEC     -498              1201-1700 SEC
 0678                   21,3247   77776 1          DEC     -1
 0679                   21,3250   37765 1          2DEC    .99934865
C0679                   21,3251   12403 0
 0680                   21,3252   37752 0          2DEC    .99868793
C0680                   21,3253   20062 1
 0681                   21,3254   00000 1          2DEC    .00000055
C0681                   21,3255   00224 0
 0682                   21,3256   00000 1          2DEC    .00001183
C0682                   21,3257   06150 0
 0683                   21,3260   77777 0          2DEC    -.00000005
C0683                   21,3261   77762 1

 0684                   21,3262   77161 1          DEC     -398              1701-2100 SEC
 0685                   21,3263   77776 1          DEC     -1
 0686                   21,3264   37767 0          2DEC    .99947099
C0686                   21,3265   12513 0
 0687                   21,3266   37756 1          2DEC    .99894799
C0687                   21,3267   30343 0
 0688                   21,3270   00000 1          2DEC    .00000018
C0688                   21,3271   00060 1
 0689                   21,3272   00000 1          2DEC    .00000300
C0689                   21,3273   01445 0
 0690                   21,3274   77777 0          2DEC    -.00000001
C0690                   21,3275   77774 0

 0691                   21,3276   76651 1          DEC     -598              2101-2700 SEC
 0692                   21,3277   77776 1          DEC     -1
 0693                   21,3300   37771 1          2DEC    .99957801
C0693                   21,3301   02603 0
 0694                   21,3302   37762 0          2DEC    .99916095
C0694                   21,3303   10061 1
 0695                   21,3304   00000 1          2DEC    .00000007
C0695                   21,3305   00023 0
 0696                   21,3306   00000 1          2DEC    .00000096
C0696                   21,3307   00402 1
 0697                   21,3310   00000 1          2DEC    .00000000
C0697                   21,3311   00000 1

 0698                   21,3312   76505 0          DEC     -698              2700-3400 SEC
 0699                   21,3313   77776 1          DEC     -1
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  0700                         21,3314   37772 1            2DEC     .99966814
 C0700                         21,3315   22005 1
  0701                         21,3316   37765 1            2DEC     .99933952
 C0701                         21,3317   05560 1
  0702                         21,3320   00000 1            2DEC     .00000002
 C0702                         21,3321   00005 1
  0703                         21,3322   00000 1            2DEC     .00000028
 C0703                         21,3323   00113 1
  0704                         21,3324   00000 1            2DEC     .00000000
 C0704                         21,3325   00000 1

  0705                         21,3326   76651 1            DEC      -598               3401-4000 SEC
  0706                         21,3327   77776 1            DEC      -1
  0707                         21,3330   37773 0            2DEC     .99972716
 C0707                         21,3331   20750 1
  0708                         21,3332   37767 0            2DEC     .99945654
 C0708                         21,3333   03044 1
  0709                         21,3334   00000 1            2DEC     .00000001
 C0709                         21,3335   00003 1
  0710                         21,3336   00000 1            2DEC     .00000010
 C0710                         21,3337   00033 1
  0711                         21,3340   00000 1            2DEC     .00000000
 C0711                         21,3341   00000 1

  0712                         21,3342   00000 1  SCHZEROS  2DEC     .00000000
 C0712                         21,3343   00000 1
  0713                         21,3344   00000 1            2DEC     .00000000
 C0713                         21,3345   00000 1
  0714                         21,3346   00000 1            2DEC     .00000000
 C0714                         21,3347   00000 1
  0715                         21,3350   00004 0  INTVAL    OCT      4
  0716                         21,3351   00002 0            OCT      2
  0717                         21,3352   00220 1            DEC      144
  0718                         21,3353   77776 1            DEC      -1
  0719                         21,3354   35730 0  SOUPLY    2DEC     .93505870            INITIAL GAINS FOR PIP OUTPUTS
 C0719                         21,3355   00035 1
  0720                         21,3356   10317 0            2DEC     .26266423            INITIAL GAINS/4 FOR ERECTION ANGLES
 C0720                         21,3357   17550 1

  0721                         21,3360   00115 1  77DECML   DEC      77
  0722     REF   6 LAST 529    21,3361   01577 0  ALXXXZ    GENADR   ALXIS -1
  0723     REF  11 LAST 523    21,3362   02500 0  AINGYRO   ECADR    OGC
  0724                         21,3363   04133 1  PIPASC    2DEC     .13055869
 C0724                         21,3364   02265 1
  0726                         21,3365   57223 0  VELSC     2DEC     -.52223476           512/980.402
 C0726                         21,3366   66451 1
  0727                         21,3367   05427 0  ALSK      2DEC     .17329931           SSWAY VEL GAIN X 980.402/4096
 C0727                         21,3370   12577 1
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L          OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION                                    USER'S OWN PAGE NO.  21

 0728                               21,3371   77567 0            2DEC     -.00835370      SSWAY ACCEL GAIN X 980.402/4096
C0728                               21,3372   44202 1

 0731                               21,3373   24276 1  GEORGEJ   2DEC     .63661977
C0731                               21,3374   14066 1
 0732                               21,3375   23073 1  GEORGEK   2DEC     .59737013
C0732                               21,3376   11773 1
 0733                               21,3377   03146 1  GEOCONS1  2DEC     .1
C0733                               21,3400   14632 0
 0734                               21,3401   00121 0  GEOCONS2  2DEC     .005
C0734                               21,3402   35341 1
 0735                               21,3403   00631 0  GEOCONS3  2DEC     .025
C0735                               21,3404   23146 0
 0736                               21,3405   00000 1  GEOCONS4  2DEC     .00003
C0736                               21,3406   17565 1
 07362                              21,3407   06200 0  1/PIPAGT  OCT      06200
 0737                               21,3410   00021 1  17DECML   DEC      17
 0738                               21,3411   00023 0  19DECML   DEC      19
 0739                               21,3412   00062 0  1/2SECX   DEC      50


 0740   REF 135 LAST 527            21,3413  3 7657 1  GTSCPSS   CA       ONE
 0741   REF   8 LAST 524            21,3414  55'742 0            TS       GEOCOMPS            THIS IS THE LEAD IN FOR COMPASS
 0743   REF   7 LAST 526            21,3415  0 4667 1            TC       NEWMODEX
 074417                             21,3416   00001 0            OCT      01
 074518 REF   1                     21,3417  3 3407 1            CA       1/PIPAGT
 074619 REF   7 LAST 217            21,3420  55'110 1            TS       1/PIPADT
 07472  REF 194 LAST 522            21,3421  3 7665 0            CA       ZERO
 074821 REF   3 LAST 522            21,3422  55'717 0            TS       PREMTRXC
 074922 REF   1                     21,3423  3 3412 0            CAF      1/2SECX
 075023 REF   3 LAST 525            21,3424  55'744 0            TS       1SECXT
 0781   REF 117 LAST 526            21,3425  0 4063 0            TC       BANKCALL
 0782   REF   1                     21,3426   36005 1            CADR     GEOIMUTT                TO IMU PERF TESTS 2


 0783                                         21,3427  ENDPREL1 EQUALS
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L       @DIGITAL AUTOPILOT ERASABLE                                               USER'S OWN PAGE NO.   1
 0001                                      E6,1400        SETLOC 3000

R0002   AXIS TRANSFORMATION MATRIX - PILOT TO GIMBAL AXES:

 0003                           E6,1400    E6,1400  MR12     ERASE                SCALED AT 2   THESE FOUR P-G MATRIX ELE-
 0004                           E6,1401    E6,1401  MR22     ERASE                SCALED AT 1   MENTS ARE IN THIS ORDER TO
 0005                           E6,1402    E6,1402  MR13     ERASE                SCALED AT 2   COMPUTE RATE HOLD DELCDUS
 0006                           E6,1403    E6,1403  MR23     ERASE                SCALED AT 1   WITH AN INDEXED LOOP
R0008   AXIS TRANSFORMATION MATRIX - GIMBAL TO PILOT AXES:

 0009                           E6,1404    E6,1404  M11      ERASE                SCALED AT 1
 0010                           E6,1405    E6,1405  M21      ERASE                SCALED AT 1
 00105                          E6,1406    E6,1406  M31      ERASE
 0011   REF   1                            E6,1401  M22      EQUALS MR22          SCALED AT 1
 0012   REF   1                            E6,1403  M32      EQUALS MR23          SCALED AT 1
R0013   ANGLE MEASUREMENTS.

 0014                           E6,1407    E6,1410  EDOT     ERASE   +1           ERROR IN ANGULAR RATE:
 0015   REF   1                            E6,1410  EDOT(R)  EQUALS EDOT +1       SCALED DOWN TO PI/16 RADIANS/SECOND

 0016                           E6,1411    E6,1412  E        ERASE   +1           ANGLE ERROR SCALED AT PI RADIANS
 0017   REF   1                            E6,1412  EDOT(2)  EQUALS E +1          ERROR RATE SQUARED SCALED AT PI(2)/16
 0018   REF   2 LAST 535                   E6,1411  EQ       EQUALS E             THIS PAIR OF NAMES IS USED TO REFER TO
 0019   REF   1                            E6,1412  EDOT(2)Q EQUALS EDOT(2)       THE ABOVE ERASABLES AS Q-AXIS DATA
 0020                           E6,1413    E6,1414  ER       ERASE   +1           THIS PAIR OF NAMES REFERS TO LOCATIONS
 0021   REF   1                            E6,1414  EDOT(2)R EQUALS ER +1         FOR THE R-AXIS DATA; INTERCHANGES WITH Q

 0022                           E6,1415    E6,1415  DB       ERASE                ANGLE DEADBAND SCALED AT PI RADIANS

 0023                           E6,1416    E6,1422  OMEGAP   ERASE   +4           BODY-AXIS ROT. RATES SCALED AT PI/4 AND
 0024   REF   1                            E6,1417  OMEGAQ   EQUALS OMEGAP +1     BODY-AXIS ACCELERATIONS SCALED AT PI/8
 0025   REF   2 LAST 535                   E6,1420  ALPHAQ   EQUALS OMEGAP +2     (IN DESCENT) OR PI/2 (IN ASCENT)
 0026   REF   3 LAST 535                   E6,1421  OMEGAR   EQUALS OMEGAP +3     THESE W,A PAIRS ARE NEEDED, ALPHAP HAS
 0027   REF   4 LAST 535                   E6,1422  ALPHAR   EQUALS OMEGAP +4     NO USE IN THE DIGITAL AUTOPILOT

 0028                           E6,1423    E6,1425  EDOTP    ERASE   +2           ERRORS IN ANGULAR RATE:
 0029   REF   1                            E6,1424  EDOTQ    EQUALS EDOTP +1      EDOT = 3MEGA - OMEGA(DESIRED)
 0030   REF   2 LAST 535                   E6,1425  EDOTR    EQUALS EDOTP +2      SCALED AT PI/4 RADIANS/SECOND

 0031   REF   1                            E6,1424  QRATEDIF EQUALS EDOTQ         ALTERNATIVE NAMES:
 0032   REF   1                            E6,1425  RRATEDIF EQUALS EDOTR         DELETE WHEN NO. OF REFERENCES = 0

 0033                           E6,1426    E6,1430  OMEGAPD  ERASE   +2           DESIRED VEHICLE RATES DETERMINED BY THE
 0034   REF   1                            E6,1427  OMEGAQD  EQUALS OMEGAPD +1    "OUTER LOOP" USED TO CALCULATE EDOT
 0035   REF   2 LAST 535                   E6,1430  OMEGARD  EQUALS OMEGAPD +2    SCALED AT PI/4 RADIANS/SECOND

 0036                           E6,1431    E6,1434  OLDXFORP ERASE   +3           STORED CDU READINGS FOR P AND Q,R RATE
 0037   REF   1                            E6,1432  OLDYFORP EQUALS OLDXFORP +1   DERIVATIONS: SCALED AT PI RADIANS (2'S)
 0038   REF   2 LAST 535                   E6,1433  OLDYFORQ EQUALS OLDXFORP +2   (THERE MUST BE TWO REGISTERS FOR CDUY
 0039   REF   3 LAST 535                   E6,1434  OLDZFORQ EQUALS OLDXFORP +3   SINCE P AND Q,R ARE NOT IN PHASE)
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L       @DIGITAL AUTOPILOT ERASABLE                                                     USER'S OWN PAGE NO.    2

R0040    RHC INPUTS SCALED AT PI/4 RAD/SEC.

 0041                          E6,1435   E6,1435  PCOM      ERASE
 0042                          E6,1436   E6,1436  RCOM      ERASE
 0043                          E6,1437   E6,1437  YCOM      ERASE

R0044    RHC COUNTER REGISTERS.

 0045                                       0043  P-RHCCTR EQUALS 43
 0046                                       0042  Q-RHCCTR EQUALS 42
 0047                                       0044  R-RHCCTR EQUALS 44

R0048    OTHER VARIABLES.

 0049                          E6,1440   E6,1440  TPSIG     ERASE
 0050                          E6,1441   E6,1441  PRATECOM  ERASE
 0051                          E6,1442   E6,1442  EDOTGEN   ERASE
 0052                          E6,1443   E6,1443  RATEDIF   ERASE
 0053                          E6,1444   E6,1444  1/2JTSP   ERASE
 0054                          E6,1445   E6,1445  1/2JTSQ   ERASE
 0055                          E6,1446   E6,1446  1/2JTSR   ERASE
 0056                          E6,1447   E6,1447  1/2JETSU  ERASE
 0057                          E6,1450   E6,1450  1/2JETSV  ERASE
 0058                          E6,1451   E6,1451  FPQR      ERASE
 0059                          E6,1452   E6,1452  MINRA     ERASE
 0060                          E6,1453   E6,1453  MINRASQ   ERASE
 0061                          E6,1454   E6,1454  HDAP      ERASE
 0062                          E6,1455   E6,1455  U         ERASE
 0063                          E6,1456   E6,1456  DENOM     ERASE
 0064                          E6,1457   E6,1457  RATIO     ERASE
 0065                          E6,1460   E6,1460  TJSR      ERASE
 0066                          E6,1461   E6,1461  IXX       ERASE
 0067                          E6,1462   E6,1462  IYY       ERASE
 0068                          E6,1463   E6,1463  IZZ       ERASE
 0069                          E6,1464   E6,1464  4JETTORK  ERASE
 0070                          E6,1465   E6,1465  JETTORK4  ERASE
 0071                          E6,1466   E6,1466  COSMG     ERASE
 0072    REF  20 LAST 371                   0066  DELTAP    EQUALS ITEMP2
 0073                          E6,1467   E6,1467  FPQRMIN   ERASE
 0074                          E6,1470   E6,1470  NJET      ERASE
 0075                          E6,1471   E6,1471  1/NJETAC  ERASE
 0076                          E6,1472   E6,1472  PRATEDIF  ERASE
 0077                          E6,1473   E6,1473  LASTPER   ERASE                    THESE 6 REG USED FOR ATT ERR DISPLAY
 0078                          E6,1474   E6,1474  LASTQER   ERASE
 0079                          E6,1475   E6,1475  LASTRER   ERASE
 0080                          E6,1476   E6,1476  PERROR    ERASE
 0081                          E6,1477   E6,1477  QERROR    ERASE
 0082                          E6,1500   E6,1500  RERROR    ERASE

R0083    JET STATE CHANGE VARIABLES- TIME (TOFJTCHG),JET BITS WRITTEN NOW
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R0084     (JTSONNOW), AND JET BITS WRITTEN AT T6 RUPT (JTSATCHG).

 0085                         E6,1501    E6,1501  JTSONNOW ERASE
 0086                         E6,1502    E6,1502  JTSATCHG ERASE
 0087                         E6,1503    E6,1503  ADDT6JTS ERASE
 0088                         E6,1504    E6,1504  ADDTLT6  ERASE
 0089                         E6,1505    E6,1505  TOFJTCHG ERASE

 0090                         E6,1506    E6,1506  -RATEDB  ERASE
 0091                         E6,1507    E6,1507  -2JETLIM ERASE

R0092   RCS FAILURE MONITOR ERASABLE - PROGRAM ON T4RUPT 4 TIMES/SECOND

R0093   *** FAILSW CAPABILITY FOR CHECKOUT ONLY ***

 0094                         E6,1510    E6,1510  FAILSW   ERASE                            IF POSITIVE NO RCSMONIT, OTHERWISE 0
 0095                         E6,1511    E6,1511  LASTFAIL ERASE                            LAST FAILURE CHANNEL RECORD, -0 INITIAL
 0096                         E6,1512    E6,1512  CH5MASK  ERASE                            MASKS FOR TURNING ON P/Q,R JETS
 0097                         E6,1513    E6,1513  CH6MASK  ERASE                            IN OUTPUT CHANNELS 5 AND 6
 0098   REF  52 LAST 430                    0065  FAILCTR  EQUALS ITEMP1                    BIT POSITION COUNTER (INTERNAL)
 0099   REF  21 LAST 536                    0066  FAILTEMP EQUALS ITEMP2                    TEMPORARY RECORD OF FAILED BITS

R0100   Q,R AXIS ERASABLES

 0101   REF  22 LAST 537                    0066  DELQ     EQUALS ITEMP2
 0102   REF  12 LAST 253                    0070  DELTAR   EQUALS ITEMP3
 0103                         E6,1514    E6,1514  TJETADR  ERASE
 0104                         E6,1515    E6,1515  URGENCYQ ERASE
 0105                         E6,1516    E6,1516  URGENCYR ERASE
 0106                         E6,1517    E6,1517  A+B      ERASE
 0107                         E6,1520    E6,1520  A-B      ERASE
 0108                         E6,1521    E6,1521  TERMA    ERASE
 0109                         E6,1522    E6,1522  TERMB    ERASE
 0110                         E6,1523    E6,1523  POLRELOC ERASE
 0111                         E6,1524    E6,1524  LOOPCTR  ERASE
 0112                         E6,1525    E6,1525  POLTEST  ERASE
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L       @DIGITAL AUTOPILOT ERASABLE                                                   USER'S OWN PAGE NO.   4

P0113   TRIM GIMBAL CONTROL LAW ERASABLES:

R0114   THE FOLLOWING ASSIGNMENTS OF RUPTREGS AND ITEMPS HAS BEEN MADE IN AN EFFORT TO OPTIMIZE USE OF ERASABLES:

 0116   REF  26 LAST 430                       0074  K2THETA   EQUALS RUPTREG1         D.P. K(2)THETA AND "NEGUSUM"
 0117   REF  27 LAST 430                       0075  ETHETA    EQUALS RUPTREG2         S.P. ERROR ANGLE SCALED AT PI/64 RADIANS
 0118   REF   9 LAST 276                       0076  A2CNTRAL  EQUALS RUPTREG3         D.P. ALPHA(2) SCALED AT PI(2)/64 R/S(2)
 0119   REF  10 LAST 538                       0076  SF1       EQUALS RUPTREG3         S.P. VARIABLE SCALE FACTORS WHICH ARE
 0120   REF  18 LAST 366                       0077  SF2       EQUALS RUPTREG4         S.P. - REALLY SINGLE BITS (OR ZERO)
 0121   REF  53 LAST 537                       0065  OMEGA.K   EQUALS ITEMP1           D.P. OMEGA*K SUPERCEDES K AND K(2)
 0122   REF  54 LAST 538                       0065  KCENTRAL  EQUALS ITEMP1           S.P. K FROM KQ OR KR FIRST AT PI/2(8)
 0123   REF  23 LAST 537                       0066  K2CNTRAL  EQUALS ITEMP2           S.P. K(2) FROM Q OR R 1ST AT PI(2)/2(16)
 0124   REF  13 LAST 537                       0070  WCENTRAL  EQUALS ITEMP3           S.P. OMEGA SCALED AT PI/4 RADIANS/SECOND
 0125   REF  11 LAST 252                       0071  ACENTRAL  EQUALS ITEMP4           S.P. ALPHA SCALED AT PI/8 RAD/SEC(2)
 0126   REF   2 LAST  10                       0072  DEL       EQUALS ITEMP5           S.P. SGN(FUNCTION)
 0127   REF   1                                0073  QRCNTR    EQUALS ITEMP6           S.P. COUNTER: Q,Y=0, R,Z=2

R0128   THE ABOVE QUANTITIES ARE ONLY NEEDED ON A VERY TEMPORARY BASIS AND HAVE BEEN PROVEN TO BE NON-CONFLICTING.

 0130                          E6,1526   E6,1526  L,PVT-CG ERASE                   TRIM GIMBAL PIVOT TO CG DIST AT 8 FEET

 0131                          E6,1527   E6,1527  MULTFLAG ERASE                   INDICATOR FOR SPDPMULT ROUTINE

 0132                          E6,1530   E6,1531  FUNCTION ERASE    +1             D.P. WORD FOR DRIVE FUNCTIONS

 0133                          E6,1532   E6,1534  NEGUQ    ERASE    +2             NEGATIVE OF Q-AXIS GIMBAL DRIVE
 0134   REF   1                          E6,1533  THRSTCMD EQUALS NEGUQ +1         THRUST COMMAND AT 16384 LBS (SEPARATOR)
 0135   REF   2 LAST 538                 E6,1534  NEGUR    EQUALS NEGUQ +2         NEGATIVE OF R-AXIS GIMBAL DRIVE

 0136                          E6,1535   E6,1540  KQ       ERASE    +3             .3ACCDOTQ SCALED AT PI/2(8)
 0137   REF   1                          E6,1536  KQ2      EQUALS KQ +1            KQ2 = KQ*KQ
 0138   REF   2 LAST 538                 E6,1537  KR       EQUALS KQ +2            .3ACCDOTR SCALED AT PI/2(8)
 0139   REF   3 LAST 538                 E6,1540  KR2      EQUALS KQ +3            KR2 = KR*KR

 0140                          E6,1541   E6,1544  ACCDOTQ  ERASE    +3             Q-JERK SCALED AT PI/2(7) UNSIGNED
 0141   REF   1                          E6,1542  QACCDOT  EQUALS ACCDOTQ +1       Q-JERK SCALED AT PI/2(7) SIGNED
 0142   REF   2 LAST 538                 E6,1543  ACCDOTR  EQUALS ACCDOTQ +2       R-JERK SCALED AT PI/2(7) UNSIGNED
 0143   REF   3 LAST 538                 E6,1544  RACCDOT  EQUALS ACCDOTQ +3       R-JERK SCALED AT PI/2(7) SIGNED

 0144   REF   1                          E6,1477  QDIFF    EQUALS QERROR           ATTITUDE ERRORS:
 0145   REF   1                          E6,1500  RDIFF    EQUALS RERROR           SCALED AT PI RADIANS

 0146                          E6,1545   E6,1545  TIMEOFFQ ERASE                   TIMES TO GO UNTIL TRIM GIMBAL TURN-OFF,
 0147                          E6,1546   E6,1546  TIMEOFFR ERASE                   ZERO MEANS NO ACTION, SCALED AS WAITLIST
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P0148   KALMAN FILTER ERASABLES.

 0149                         E6,1547  E6,1547  STORCDUY ERASE               THIS S.P. PAIR IS USED TO SAVE CDUY,Z
 0150                         E6,1550  E6,1550  STORCDUZ ERASE               FOR THE GTS RUPT

 0151   REF  11 LAST 538                  0076  CDU      EQUALS RUPTREG3     RUPTREG3,4 USED AS D.P. WORD FOR CDU
A0152                                                                        VALUE WITHIN FILTER IS COMP AT 2PI RAD

 0153   REF  55 LAST 538                  0065  CDUDOT   EQUALS ITEMP1       ITEMP1,2 USED AS D.P. WORD FOR CDUDOT
A0154                                                                        VALUE WITHIN FILTER SCALED AT PI/4

 0155   REF  14 LAST 538                  0070  CDU2DOT  EQUALS ITEMP3       ITEMP3,4 USED AS D.P. WORD FOR CDU2DOT
A0156                                                                        VALUE WITHIN FILTER SCALED AT PI/8

 0157                         E6,1551  E6,1551  DT       ERASE               TIME ELAPSED SCALED AT 1/8: NOMINAL=50MS
 0158                         E6,1552  E6,1552  DAPTIME  ERASE               USED TO RECORD LAST TIME FROM CHANNEL 4

 0159                         E6,1553  E6,1553  STEERADR ERASE               DTCALC SWITCH IN FILTER INITIALIZATION

 0160                         E6,1554  E6,1555  DPDIFF   ERASE    +1         D.P. WEIGHTING VECTOR FACTOR AT PI
 0161                         E6,1556  E6,1556  WPOINTER ERASE               POINTER TO WEIGHTING VECTOR TABLE
 0162                         E6,1557  E6,1561  W0       ERASE    +2         THETA WEIGHT
 0163   REF   1                        E6,1560  W1       EQUALS W0 +1        OMEGA WEIGHT
 0164   REF   1                        E6,1561  W2       EQUALS W1 +1        ALPHA WEIGHT

 0165                         E6,1562  E6,1563  CDUYFIL  ERASE    +1         Y-AXIS D.P. FILTERED THETA AT 2PI
 0166                         E6,1564  E6,1565  CDUZFIL  ERASE    +1         Z-AXIS D.P. FILTERED THETA AT 2PI
 0167                         E6,1566  E6,1567  DCDUYFIL ERASE    +1         Y-AXIS D.P. FILTERED OMEGA AT PI/4
 0168                         E6,1570  E6,1571  DCDUZFIL ERASE    +1         Z-AXIS D.P. FILTERED OMEGA AT PI/4
 0169                         E6,1572  E6,1573  D2CDUYFL ERASE    +1         Y-AXIS D.P. FILTERED ALPHA AT PI/8
 0170                         E6,1574  E6,1575  D2CDUZFL ERASE    +1         Z-AXIS D.P. FILTERED ALPHA AT PI/8
 0171                         E6,1576  E6,1576  Y3DOT    ERASE               Y-AXIS S.P. JERK AT PI/2(7)
 0172                         E6,1577  E6,1577  CDU3DOT  ERASE                                   LOOP REGISTER (SPACER)
 0173                         E6,1600  E6,1600  Z3DOT    ERASE               Z-AXIS S.P. JERK AT PI/2(7)

 0174                         E6,1601  E6,1602  PFILTADR ERASE    +1         2CADR FOR FILTER RUPT 30 MS AFTER P-AXIS
 0175                         E6,1603  E6,1612  PFRPTLST ERASE    +7         POST FILTER RUPT LIST
 017502                       E6,1613  E6,1613  PJUMPADR ERASE
 017504                       E6,1614  E6,1614  QJUMPADR ERASE
R0176   TORQUE VECTOR RECONSTRUCTION VARIABLES:

 0177   *          DELETE
 0178                         E6,1615  E6,1617  JETRATE  ERASE    +2         WEIGHTED RATES DUE TO JETS APPLIED IN
 0179   REF   1                        E6,1616  JETRATEQ EQUALS JETRATE +1   THE LAST CONTROL SAMPLE PERIOD OF 100 MS
 0180   REF   2 LAST 539               E6,1617  JETRATER EQUALS JETRATE +2   SCALED AT PI/4 RADIANS/SECOND

 0181                         E6,1620  E6,1621  NO.QJETS ERASE    +1         NUMBER OF Q AND R JETS THAT ARE GIVEN
 0182   REF   1                        E6,1621  NO.RJETS EQUALS NO.QJETS +1  BY THE JET SELECT LOGIC

 018202                       E6,1622  E6,1622  100MSPTQ ERASE
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L       @DIGITAL AUTOPILOT ERASABLE                                                   USER'S OWN PAGE NO.   6

 018204                      E6,1623   E6,1623  QR.1STOQ ERASE
 018206                      E6,1624   E6,1624  NO.PJETS ERASE
 0183                        E6,1625   E6,1626  TP       ERASE    +1            TIME CALCULATED BY TJETLAW FOR P, QR
 0184    REF   1                       E6,1626  TQR      EQUALS TP +1           SCALED AS TIME6, THEN TQR RESCALED TO 1

 0185                        E6,1627   E6,1633  1JACC    ERASE    +4            ACCELERATIONS DUE TO 1 JET TORQUING
 0186    REF   1                       E6,1630  1JACCQ   EQUALS 1JACC +1        SCALED AT PI/4 RADIANS/SECOND
 0187    REF   2 LAST 540              E6,1631  1JACCR   EQUALS 1JACC +2
 0188    REF   3 LAST 540              E6,1632  1JACCU   EQUALS 1JACC +3        FOR U,V-AXES THE SCALE FACTOR IS  DIFF:
 0189    REF   4 LAST 540              E6,1633  1JACCV   EQUALS 1JACC +4        SCALED AT PI/2 RADIANS/SECOND (FOR ASC)

R0190    ASCENT VARIABLES:

 0191                        E6,1634   E6,1637  AOSQ     ERASE    +3            ASCENT OFFSET ACCELERATIONS
 0192    REF   1                       E6,1635  AOSR     EQUALS AOSQ +1         ESTIMATED EVERY 2 SECONDS BY AOSTASK
 0193    REF   2 LAST 540              E6,1636  AOSU     EQUALS AOSQ +2         U,V-ACCS ARE FORMED BY VECTOR ADDITION
 0194    REF   3 LAST 540              E6,1637  AOSV     EQUALS AOSQ +3         SCALED AT PI/2 RADIANS/SECOND(2)

 0195    REF  15 LAST 539                 0070  ABVLAOSQ EQUALS ITEMP3          ASCENT OFFSET ACCELERATIONS (ABVAL)
 0196    REF   1                          0071  ABVLAOSR EQUALS ABVLAOSQ +1     SCALED AT PI/2 RADIANS/SECOND(2)
 0197    REF   2 LAST 540                 0072  ABVLAOSU EQUALS ABVLAOSQ +2
 0198    REF   3 LAST 540                 0073  ABVLAOSV EQUALS ABVLAOSQ +3

 0199                        E6,1640   E6,1641  SUMRATEQ ERASE    +1            SUM OF UN-WEIGHTED JETRATE TERMS
 0200    REF   2 LAST 187              E6,1641  SUMRATER EQUALS SUMRATEQ +1     SCALED AT PI/4 RADIANS/SECOND

 0201                        E6,1642   E6,1643  AOSQTERM ERASE    +1            (.1-.05K)AOS
 0202    REF   2 LAST 188              E6,1643  AOSRTERM EQUALS AOSQTERM +1     SCALED AT PI/4 RADIANS/SECOND

 0203                        E6,1644   E6,1645  OLDWFORQ ERASE    +1            OMEGA VALUE 2 SECONDS AGO
 0204    REF   2 LAST 187              E6,1645  OLDWFORR EQUALS OLDWFORQ +1     SCALED AT PI/4 RADIANS/SECOND

 0205                        E6,1646   E6,1647  DBMINIMP ERASE    +1            MINIMUM IMPULSE DEADBANDS (EQUAL IN DESC
 0206    REF   3 LAST 187              E6,1647  MINIMPDB EQUALS DBMINIMP +1     AT .3 DEG, 0,-DB RESPECTIVELY FOR ASC)
A0207                                                                           SCALED AT PI RADIANS

 0208                        E6,1650   E6,1654  .5ACCMNE ERASE    +4            (1/2)(1/ACCMIN) WHICH IS THE INVERSE OF
 0209    REF   1                       E6,1651  .5ACCMNQ EQUALS .5ACCMNE +1     THE MINIMUM ACCELERATION (A CONSTANT FOR
 0210    REF   2 LAST 540              E6,1652  .5ACCMNR EQUALS .5ACCMNE +2     DESCENT AND A VARIABLE FOR ASCENT DAP)
 0211    REF   3 LAST 540              E6,1653  .5ACCMNU EQUALS .5ACCMNE +3     SCALED AT 2(+8)/PI
 0212    REF   4 LAST 540              E6,1654  .5ACCMNV EQUALS .5ACCMNE +4     IN UNITS OF SECONDS(2)/RADIAN

 0213                        E6,1655   E6,1656  WFORP    ERASE    +1            W = K/(NOMINAL DT)
 0214    REF   1                       E6,1656  WFORQR   EQUALS WFORP +1        SCALED AT 16

 0215                        E6,1657   E6,1660  (1-K)QR  ERASE    +1            1-K SCALED AT 1
 0216    REF   1                       E6,1660  (1-K)/8  EQUALS (1-K)QR +1      1-K SCALED AT 8

 0217                        E6,1661   E6,1664  1/NJTSQ  ERASE    +3            1/NJETACC FOR EACH AXIS
 0218    REF   1                       E6,1662  1/NJTSR  EQUALS 1/NJTSQ +1      FOR DESCENT THIS IS ALWAYS 1/2JTS
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L      @DIGITAL AUTOPILOT ERASABLE                                                USER'S OWN PAGE NO.   7

 0219  REF   2 LAST 540                 E6,1663  1/NJTSU   EQUALS 1/NJTSQ +2      FOR ASCENT WITH HIGH OFFSET: 1/4JTS
 0220  REF   3 LAST 541                 E6,1664  1/NJTSV   EQUALS 1/NJTSQ +3      SCALED AT 2(8)/PI SEC(2)/RAD

 0221                         E6,1665   E6,1670  QMANDACC ERASE   +3              ASCENT FLAGS
 0222  REF   1                          E6,1666  RMANDACC EQUALS QMANDACC +1      0: INDICATES NO OVER-RIDE OF 2 JETS
 0223  REF   2 LAST 541                 E6,1667  UMANDACC EQUALS QMANDACC +2      1: INDICATES USE 4 INSTEAD OF 2 JETS
 0224  REF   3 LAST 541                 E6,1670  VMANDACC EQUALS QMANDACC +3      (ALWAYS ZERO FOR DESCENT)

 0225                         E6,1671   E6,1671  KCOEFCTR ERASE                   COUNTER FOR ASCENT DAP


R0226  THE SAVE RATE INDEX AND THE THREE DELCDUS ARE LOCATED HERE TEMPORARILY, AWAITING MORE LOGICAL PLACEMENT WHEN THE
R0228  DAP IS ASSEMBLED INTO SUNBURST

 0229                         E6,1672   E6,1672  DLCDUIDX ERASE                   SAVE RATE INDEX, = 1, 0
 0230                         E6,1673   E6,1673  DELCDUX  ERASE
 0231                         E6,1674   E6,1674  DELCDUY  ERASE                   DELCDUS ARE SCALED AT PI, LIKE THE CDUS
 0232                         E6,1675   E6,1675  DELCDUZ  ERASE
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L        @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                      USER'S OWN PAGE NO.   1

0001                                   23,2000                   BANK     23
0002     REF   3 LAST 159                   E6                   EBANK=   DT

R0003    THE FOLLOWING SECTION DRIVES THE ATTITUDE ERROR NEEDLES IN THE "EIGHT-BALL" DISPLAY:

0005     REF  13 LAST 280        23,2000  22 765 0  EIGHTBAL LXCH     DAPBOOLS         ATTITUDE ERRORS DISPLAYED EVERY
0006     REF  26 LAST 468        23,2001  3 7651 1           CAF      BIT7             OTHER DAP CYCLE (.2 SECS)
0007                             23,2002  0 0006 1           EXTEND                    CHANGE STATE OF FLAG
0008     REF 176 LAST 529        23,2003  06 001 0           RXOR     L
0009     REF  14 LAST 542        23,2004  54 765 1           TS       DAPBOOLS         FLAG WORD RESTORE
0010     REF  27 LAST 542        23,2005  7 7651 0           MASK     BIT7
0011                             23,2006  0 0006 1           EXTEND                    ZERO AS NEW STATE MEANS
0012     REF   1                 23,2007  1 2146 1           BZF      PAXFILT          NO DISPLAY THIS CYCLE

0013     REF  76 LAST 525        23,2010  3 7656 0  ATERDSPY CAF      TWO              INIT. INDEX WORD
0014     REF  56 LAST 539        23,2011  54 065 0           TS       ITEMP1
0015     REF 335 LAST 530        23,2012  50 000 1           INDEX    A
0016     REF   1                 23,2013  11'476 1           CCS      PERROR           LOOK AT CURRENT ATT ERROR
0017     REF   1                 23,2014  1 2037 0           TCF      ERLIMCHK         HAVE E VALUE GET MAGNITUDE
0018     REF   1                 23,2015  1 2017 1           TCF      ZERR             ZERO VALUE
0019     REF   2 LAST 542        23,2016  1 2037 0           TCF      ERLIMCHK         GET MAGNITUDE
0020     REF  57 LAST 542        23,2017  50 065 1  ZERR     INDEX    ITEMP1
0021     REF   2 LAST 542        23,2020  4 1476 1           CS       PERROR
0022     REF  58 LAST 542        23,2021  50 065 1           INDEX    ITEMP1
0023     REF   1                 23,2022  57'473 0           XCH      LASTPER          SAVE CURRENT E, LOAD LAST E (NEG)
0024     REF  59 LAST 542        23,2023  50 065 1           INDEX    ITEMP1
0025     REF   3 LAST 542        23,2024  6 1476 0           AD       PERROR           GET DIFF E(N-2) - E(N)
0026                             23,2025  0 0006 1           EXTEND
0027     REF  23 LAST 437        23,2026  7 7643 0           MP       BIT13            SHIFT RIGHT 2
0028     REF  60 LAST 542        23,2027  50 065 1           INDEX    ITEMP1
0029     REF   4 LAST 273        23,2030  54 050 0           TS       CDUXCMD          STORE CMD E VALUE
0030     REF  61 LAST 542        23,2031  10 065 0           CCS      ITEMP1
0031     REF   1                 23,2032  1 2011 1           TCF      ATERDSPY +1      GET NEXT E

0032     REF   1                 23,2033  3 3405 0           CA       OCT70000  BIT6   ICDU DRIVE BITS 13,14,15
0033                             23,2034  0 0006 1           EXTEND
0034                             23,2035  05 014 1           WOR      14               DRIVE AWAY
0035     REF   2 LAST 542        23,2036  1 2146 1           TCF      PAXFILT          ATT ERROR DISPLAY DONE FOR THIS CYCLE

0036     REF  38 LAST 467        23,2037  6 7657 1  ERLIMCHK AD       BIT1  AD-5+1     HAVE MAG OF E, SEE IF GREATER THAN
0037                             23,2040  4 0000 0           COM                          5 DEGREES
0038     REF   1                 23,2041  6 5040 0           AD       5DEGS
0039                             23,2042  0 0006 1           EXTEND
0040     REF   1                 23,2043  6 2045 1           BZMF     BIGATER  ZERR    ERROR GREATER THAN 5 DEGS, DSPY 5 DEGS
0041     REF   2 LAST 542        23,2044  1 2017 1           TCF      ZERR             E LESS THAN 5 DEGS, NORMAL PROCED

0042     REF  62 LAST 542        23,2045  50 065 1  BIGATER  INDEX    ITEMP1
0043     REF   4 LAST 542        23,2046  11'476 1           CCS      PERROR           GET SIGN OF BIG ERROR
0044     REF   2 LAST 542        23,2047  3 5040 0           CA       5DEGS
0045                             23,2050  1 2052 0           TCF      +2               CANT BE ZERO HERE
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L       @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                   USER'S OWN PAGE NO.   2

 0046   REF    3 LAST 542     23,2051  4 5040 1           CS      5DEGS
 0047   REF   63 LAST 542     23,2052  50 065 1           INDEX   ITEMP1
 0048   REF    5 LAST 542     23,2053  55'476 1           TS      PERROR           SET BIG ERROR TO 5DEGS
 0049   REF    3 LAST 542     23,2054  1 2017 1           TCF     ZERR

R0050   END OF ATTITUDE ERROR NEEDLE DRIVER.  (SHOULD GO IN-LINE SOMETIME.)


R0051   THE FOLLOWING T5RUPT ENTRY BEGINS THE PROGRAM WHICH CONTROLS THE P-AXIS ACTION OF THE LEM USING THE RCS JETS.
R0053   THE NOMINAL TIME BETWEEN THE P-AXIS RUPTS IS 100 MS IN ALL NON-IDLING MODES OF THE DAP.

 0055   REF    1              23,2055  3 3072 1  PAXIS    CAF     MS30P            RESET TIMER IMMEDIATELY: DT = 30 MS
 0056   REF    2 LAST 156     23,2056  54 030 0           TS      TIME5

 0057   REF    9 LAST 371     23,2057  22 016 0           LXCH    BANKRUPT         INTERRUPT LEAD IN (CONTINUED)
 0058                         23,2060  0 0006 1           EXTEND
 0059   REF    9 LAST 286     23,2061  22 012 1           QXCH    QRUPT

R0060   CHECK TO SEE IF DAP IS STILL IN USE:

 0061                         23,2062  0 0006 1           EXTEND                   IF BOTH BITS 13 AND 14 OF CHANNEL 31 ARE
 0062                         23,2063  00 031 0           READ    31               EQUAL TO 1, THEN THE SCS MODE SWITCH IS
 0063                         23,2064  4 0000 0           COM                      IN THE OFF POSITION.  ACTUALLY, THE TEST
 0064   REF    3 LAST 467     23,2065  7 7700 0           MASK    BIT13-14         IS MADE ON BOTH THE ATTITUDE HOLD AND
 0065                         23,2066  0 0006 1           EXTEND                   AUTOMATIC MODE BITS.
 0066   REF    1              23,2067  1 3124 1           BZF     GOIDLE

R0067   WHILE DAP IS ON, SET UP EITHER A KALMAN FILTER RUPT OR A DUMMY FILTER RUPT BY SETTING UP T5ADR FROM ERASABLE.

 0069                         23,2070  0 0006 1           EXTEND                   T5ADR IS SET TO EITHER FILTER OR
 0070   REF    1              23,2071  3 1602 1           DCA     PFILTADR         DUMMYFIL IN A BLIND MANNER SINCE
 0071   REF    3 LAST 153     23,2072  52 346 1           DXCH    T5ADR            PFILTADR IS SET UP ELSEWHERE

R0072   DO P AXIS RATE DERIVATION AND CONTROL LAW.
R0073   DERIVE DELTA P.

 0074   REF   26 LAST 512     23,2073  30 032 0  FILT/PAX CAE     CDUX
 0075   REF  177 LAST 542     23,2074  54 001 1           TS      L
 0076                         23,2075  0 0006 1           EXTEND
 0077   REF    4 LAST 535     23,2076  21'431 1           MSU     OLDXFORP         SCALED AT PI
 0078   REF    5 LAST 543     23,2077  23'431 0           LXCH    OLDXFORP
 0079                         23,2100  0 0006 1           EXTEND
 0080   REF   28 LAST 542     23,2101  7 7651 0           MP      BIT7
 0081   REF    1              23,2102  22 066 1           LXCH    DELTAP           SCALE AT PI/2(6)
 0082   REF    9 LAST 512     23,2103  3 0033 1           CA      CDUY
 0083   REF  178 LAST 543     23,2104  54 001 1           TS      L
 0084                         23,2105  0 0006 1           EXTEND
 0085   REF    1              23,2106  21'432 1           MSU     OLDYFORP         SCALED AT PI
 0086   REF    2 LAST 543     23,2107  23'432 0           LXCH    OLDYFORP
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L       @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                           USER'S OWN PAGE NO.   3

 0087                      23,2110  0 0006 1           EXTEND
 0088    REF  29 LAST 543  23,2111  7 7651 0           MP       BIT7           INTO L SCALED AT PI/2(6)
 0089    REF   4 LAST 181  23,2112  3 1404 0           CA       M11            M11 SCALED AT 1
 0090                      23,2113  0 0006 1           EXTEND
 0091    REF 179 LAST 543  23,2114  7 0001 1           MP       L              INTO A SCALED AT PI/2(6).
 0092    REF   2 LAST 543  23,2115  6 0066 1           AD       DELTAP
 0093                      23,2116  0 0006 1           EXTEND
 0094    REF   2 LAST 540  23,2117  7 1655 1           MP       WFORP          SCALED AT 2(4)=16, RESULT IN A AT PI/4.
 0095    REF   5 LAST 535  23,2120  57'416 0           XCH      OMEGAP         W*DELTAP IN OMEGAP LOC. OLD OMEGAP IN A.
 0096                      23,2121  0 0006 1           EXTEND
 0097    REF   1           23,2122  7 3066 0           MP       ONE-K          SCALED AT 1.
 0098    REF   3 LAST 539  23,2123  6 1615 1           AD       JETRATE        RATE DUE TO JETS TORQUING.
 0099    REF   6 LAST 544  23,2124  27'416 1           ADS      OMEGAP         PRATE= WFORP*DELTAP+ALPHA*LAST-PRATE+TPF
 0100    REF   2 LAST  33  23,2125  0 4177 1           TC       T6JOBCHK       T6JOBCHK IS IN FIXED-FIXED

R010002 ***** KALCMANU-DAP AND "RATE-HOLD"-DAP INTERFACE *****

R010004 THE FOLLOWING SECTION IS EXECUTED EVERY 100 MS (10 TIMES A SECOND) WITHIN THE P-AXIS REACTION CONTROL SYSTEM
R010008 AUTOPILOT (WHENEVER THE DAP IS IN OPERATION).

 01001   REF  77 LAST 542  23,2126  3 7656 0           CAF      TWO            SET UP LOOP TO DO Z,Y,X CDU AXES:
 010012  REF   1           23,2127  54 073 1 KALCLOOP  TS       QRCNTR

 010014  REF   2 LAST 544  23,2130  50 073 0           INDEX    QRCNTR         KALCMANU AND RATE-HOLD USE THIS SECTION
 010016  REF   2 LAST 280  23,2131  30 774 0           CAE      CDUXD          TO PERFORM THEIR INDEPENDENT FUNCTIONS:
 010018                    23,2132  0 0006 1           EXTEND                  BOTH PROCEDURES SET UP THE DELCDU'S
 01002   REF   3 LAST 544  23,2133  5 0073 0           INDEX    QRCNTR         TO HAVE THE NEGATIVE VALUE OF THE
 010022  REF   1           23,2134  21'673 0           MSU      DELCDUX        DESIRED CDU CHANGE FOR EACH 100 MS CSP
 010024  REF 336 LAST 542  23,2135  10 000 0           CCS      A              DURING THE MANEUVER (OR MODE).  EACH IS
 010026  REF 136 LAST 534  23,2136  6 7657 1           AD       ONE            STORED AT PI RADIANS IN 2'S COMPLEMENT.
 010028                    23,2137  1 2141 0           TCF       +2            SINCE THE MODULAR SUBTRACT YIELDS THE
 01003                     23,2140  4 0000 0           COM                     NEW CDUD VALUE IN 1'S COMPLEMENT, THE
 010032  REF   4 LAST 544  23,2141  50 073 0           INDEX    QRCNTR         CCS SECTION IS NEEDED FOR 1'S TO 2'S
 010034  REF   3 LAST 544  23,2142  54 774 1           TS       CDUXD          CONVERSION OF DESIRED CDU ANGLES.

 010036  REF   5 LAST 544  23,2143  10 073 1           CCS      QRCNTR         (THIS MAKES THE LOOP DO ALL THREE AXES
 010038  REF   1           23,2144  1 2127 0           TCF      KALCLOOP       IN THE ORDER Z, Y, X.)



 0101    REF   1           23,2145  1 2000 1           TCF      EIGHTBAL

 010102  REF   1           23,2146  0 1613 1 PAXFILT   TC       PJUMPADR
 010106  REF   1           23,2147  3 3361 0 SKIPPAXS  CA       VISFZADR
 010108  REF   2 LAST 544  23,2150  55'613 0           TS       PJUMPADR
 010109  REF 195 LAST 534  23,2151  3 7665 0           CA       ZERO
 01011   REF   4 LAST 544  23,2152  55'615 0           TS       JETRATE
 010111  REF   2 LAST 540  23,2153  3 1625 1           CA       TP
 010112  REF   1           23,2154  6 3071 1           AD       NEGCSPI
 010114  REF 337 LAST 544  23,2155  10 000 0           CCS      A
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010116 REF    1         23,2156   0 2167 0               TC      PTORQUE
010118 REF   15 LAST 287  23,2157   1 4606 1             TCF     RESUME
01012  REF    2 LAST 545  23,2160   0 2167 0             TC      PTORQUE
010122 REF    5 LAST 544  23,2161   4 1615 0             CS      JETRATE
010123 REF    7 LAST 544  23,2162   27'416 1             ADS     OMEGAP
010124 REF  196 LAST 544  23,2163   3 7665 0             CA      ZERO
010125 REF    6 LAST 545  23,2164   55'615 0             TS      JETRATE
010126 REF   16 LAST 545  23,2165   1 4606 1             TCF     RESUME
010128                  23,2166    20000 0  ~~(1-K)/8P OCTAL   20000~~
01013  REF  137 LAST 544  23,2167   6 7657 1  PTORQUE    AD      ONE
010132                  23,2170   0 0006 1               EXTEND
010134 REF   20 LAST 509  23,2171   7 7653 1             MP      BIT5
010136 REF  180 LAST 544  23,2172   3 0001 0             CA      L
010138                  23,2173   0 0006 1               EXTEND
01014  REF    1         23,2174   7 3074 0               MP      16/25
010142 REF    3 LAST 544  23,2175   55'625 0             TS      TP
010144 REF    3 LAST 544  23,2176   3 1655 0             CAF     WFORP
010146 REF    1         23,2177   6 2166 1               AD      (1-K)/8P
010148                  23,2200   0 0006 1               EXTEND
01015  REF    4 LAST 545  23,2201   7 1625 0             MP      TP
010152                  23,2202   0 0006 1               EXTEND
010154 REF   29 LAST 487  23,2203   7 7654 0             MP      BIT4
010156 REF    5 LAST 540  23,2204   3 1627 0             CA      IJACC
010158                  23,2205   0 0006 1               EXTEND
01016  REF  181 LAST 545  23,2206   7 0001 1             MP      L
010162                  23,2207   0 0006 1               EXTEND
010164 REF    1         23,2210   7 1624 1               MP      NO.PJETS
010166 REF    7 LAST 545  23,2211   23'615 1             LXCH    JETRATE
010168 REF  281 LAST 529  23,2212   0 0002 0             TC      Q
0102   REF   13 LAST 500  23,2213   3 7647 0  CHKVISFZ   CAF     BIT9          VISIBILITY PHASE BIT
0103   REF   15 LAST 542  23,2214   7 0765 1             MASK    DAPBOOLS
0104                    23,2215   0 0006 1               EXTEND
0105                    23,2216   1 2220 1               BZF     +2
0106   REF    1         23,2217   1 2617 1               TCF     PURGENCY      ATTITUDE STEER DURING VISIBILITY PHASE

0107   REF   43 LAST 510  23,2220   3 7646 1             CAF     BIT10         BIT10=1 FOR RHC MINIMUM IMPULSE MODE
0108   REF   16 LAST 545  23,2221   7 0765 1             MASK    DAPBOOLS
0109                    23,2222   0 0006 1               EXTEND
0110   REF    1         23,2223   1 2305 1               BZF     DETENTCK      BRANCH FOR RATE COMMAND

0111   REF    2 LAST  28  23,2224   30 773 1             CAE     DELAYCTR      SET BY RUPT10 TO TWO
0112                    23,2225   0 0006 1               EXTEND
0113   REF    1         23,2226   1 2260 0               BZF     BITSGONE      CHECK FOR ALL SWITCHES OPEN

0114   REF    1         23,2227   4 3102 0               CS      -TJMINT6
0115   REF    1         23,2230   55'505 1               TS      TOFJTCHG

0116   REF    5 LAST 545  23,2231   55'625 0             TS      TP            FOR RATE DERIVATION
0117   REF   17 LAST 468  23,2232   3 7655 0             CA      BIT3
0118                    23,2233   0 0006 1               EXTEND
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L     @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                              USER'S OWN PAGE NO.   5

 0119                       23,2234  02 031 1            RAND    31
 0120                       23,2235  0 0006 1            EXTEND
 0121   REF    1            23,2236  1 2251 1            BZF     +MINIMP

 0122   REF   30 LAST 545   23,2237  3 7654 1            CA      BIT4
 0123                       23,2240  0 0006 1            EXTEND
 0124                       23,2241  02 031 1            RAND    31
 0125                       23,2242  0 0006 1            EXTEND
 0126   REF    1            23,2243  1 2253 0            BZF     -MINIMP

 0127   REF    3 LAST 545   23,2244  10 773 0            CCS     DELAYCTR          DELAYCTR ALWAYS PNZ HERE
 0128   REF    4 LAST 546   23,2245  54 773 0            TS      DELAYCTR
 0129                       23,2246  0 0006 1            EXTEND
 0130   REF    1            23,2247  1 2277 0            BZF     PLETRUPT
 0131   REF    1            23,2250  1 2612 1            TCF     JETSOFF

 0132   REF   39 LAST 542   23,2251  3 7657 1  +MINIMP   CAF     BIT1
 0133                       23,2252  1 2254 1            TCF     +2
 0134   REF   40 LAST 546   23,2253  4 7657 0  -MINIMP   CS      BIT1
 0135   REF    1            23,2254  55'440 1  +2        TS      TPSIG
 0136   REF  197 LAST 545   23,2255  3 7665 0            CAF     ZERO
 0137   REF    5 LAST 546   23,2256  54 773 0            TS      DELAYCTR
 0138   REF    1            23,2257  1 2462 1            TCF     2PJETS

 0139                       23,2260  0 0006 1  BITSGONE  EXTEND                    ARE SWITCHES ALL OPEN
 0140                       23,2261  00 031 0            READ    31
 0141                       23,2262  4 0000 0            COM
 0142   REF    1            23,2263  7 3103 1            MASK    DAPLOW6
 0143                       23,2264  0 0006 1            EXTEND
 0144                       23,2265  1 2267 1            BZF     +2
 0145   REF    2 LAST 546   23,2266  1 2612 1            TCF     JETSOFF

 0146   REF   31 LAST 546   23,2267  3 7654 1            CAF     BIT4              BIT4 OF DAPBOOLS ZERO IF PREVIOUS
 0147   REF   17 LAST 545   23,2270  7 0765 1            MASK    DAPBOOLS          READING OF 31 FOUND ALL SWITCHES OPEN
 0148                       23,2271  0 0006 1            EXTEND
 0149   REF    2 LAST 546   23,2272  1 2277 0            BZF     PLETRUPT

 0150   REF   32 LAST 546   23,2273  4 7654 0            CS      BIT4
 0151   REF   18 LAST 546   23,2274  7 0765 1            MASK    DAPBOOLS
 0152   REF   19 LAST 546   23,2275  54 765 1            TS      DAPBOOLS
 0153   REF    3 LAST 546   23,2276  1 2612 1            TCF     JETSOFF

 0154   REF   33 LAST 546   23,2277  3 7654 1  PLETRUPT  CAF     BIT4
 0155   REF   20 LAST 546   23,2300  26 765 1            ADS     DAPBOOLS
 0156   REF   20 LAST 424   23,2301  3 7644 0            CAF     BIT12
 0157                       23,2302  0 0006 1            EXTEND
 0158                       23,2303  05 013 0            WOR     13
 0159   REF    4 LAST 546   23,2304  1 2612 1            TCF     JETSOFF
 0160   REF   32 LAST 377   23,2305  3 7641 0  DETENTCK  CA      BIT15
 0161                       23,2306  0 0006 1            EXTEND
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L       @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                                  USER'S OWN PAGE NO.   6

  0162                          23,2307  02 031 1            RAND    31              CHECK OUT-OF-DETENT BIT.INVERTED.
  0163                          23,2310  0 0006 1            EXTEND
  0164  REF    1                23,2311  1 2346 0            BZF     RHCMOVED        BRANCH IF OUT OF DETENT
 R0165  ..................................................................................
  0166  REF   41 LAST 546       23,2312  3 7657 1            CAF     BIT1            IN DETENT.CHECK THE RATE COMMAND BIT
  0167  REF   21 LAST 546       23,2313  7 0765 1            MASK    DAPBOOLS        BIT1 OF DAPBOOLS IS RATE COMMAND BIT
  0168                          23,2314  0 0006 1            EXTEND
  0169  REF    2 LAST 545       23,2315  1 2617 1            BZF     PURGENCY        BRANCH IF NOT IN RATE COMMAND
 R0170  ..................................................................................
  0171  REF   24 LAST 542       23,2316  3 7643 1            CAF     BIT13           CHECK ATTITUDE HOLD BIT
  0172                          23,2317  0 0006 1            EXTEND
  0173                          23,2320  02 031 1            RAND    31
  0174                          23,2321  0 0006 1            EXTEND
  0175  REF    1                23,2322  1 2417 0            BZF     JOEY            BRANCH IF IN ATTITUDE HOLD
 R0176  ..................................................................................
  0177  REF    8 LAST 545       23,2323  11 416 1            CCS     OMEGAP          HERE IF IN X-AXIS OVER-RIDE
  0178                          23,2324  1 2330 1            TCF     +4
  0179  REF    1                23,2325  1 2334 0            TCF     RATEDONE
  0180                          23,2326  1 2330 1            TCF     +2
  0181  REF    2 LAST 547       23,2327  1 2334 0            TCF     RATEDONE
  0182  REF    1                23,2330  6 1506 0            AD      -RATEDB
  0183                          23,2331  0 0006 1            EXTEND
  0184  REF    3 LAST 547       23,2332  6 2334 1            BZMF    RATEDONE
  0185  REF    2 LAST 547       23,2333  1 2417 0            TCF     JOEY

  0186  REF   42 LAST 547       23,2334  4 7657 0  RATEDONE  CS      BIT1
  0187  REF   22 LAST 547       23,2335  7 0765 1            MASK    DAPBOOLS
  0188  REF   23 LAST 547       23,2336  54 765 1            TS      DAPBOOLS

 R0189  READ CDUS INTO CDU DESIRED REGISTERS

  0190  REF   27 LAST 543       23,2337  3 0032 0            CA      CDUX
  0191  REF    4 LAST 544       23,2340  54 774 1            TS      CDUXD
  0192  REF   10 LAST 543       23,2341  3 0033 1            CA      CDUY
  0193  REF    1                23,2342  54 775 0            TS      CDUYD
  0194  REF   14 LAST 512       23,2343  3 0034 0            CA      CDUZ
  0195  REF    2 LAST 280       23,2344  54 776 0            TS      CDUZD

  0196  REF    5 LAST 546       23,2345  1 2612 1            TCF     JETSOFF

  0197  REF   43 LAST 547       23,2346  3 7657 1  RHCMOVED  CAF     BIT1            CHECKING THE RATE COMMAND BIT
  0198  REF   24 LAST 547       23,2347  7 0765 1            MASK    DAPBOOLS
  0199                          23,2350  0 0006 1            EXTEND
  0200  REF    1                23,2351  1 2371 1            BZF     JUSTOUT

 R0201  READ,ZERO, AND ENABLE COUNTERS
 R0202  SYSTEM HAS BEEN IN RATE COMMAND FOR AT LEAST THE TIME OF A CAP CHARGE

  0203  REF    1                23,2352  30 043 0            CAE     P-RHCCTR        1 BIT IN P-RHCCTR WORTH 0.6256 DEG/SEC
  0204                          23,2353  0 0006 1            EXTEND
 0205   REF  14 LAST 545    23,2354  7 7647 1            MP      BIT9
 0206   REF 182 LAST 545    23,2355  3 0001 0            CA      L
 0207                       23,2356  0 0006 1            EXTEND
 0208   REF   1             23,2357  7 3073 1            MP      0.88975
 0209   REF   1             23,2360  55'441 0            TS      PRATECOM        COMMANDED RATE SCALED AT PI/4

 0210   REF 198 LAST 546    23,2361  3 7665 0            CAF     ZERO            ZERO COUNTERS
 0211   REF   2 LAST 547    23,2362  54 043 1            TS      P-RHCCTR
 0212   REF   1             23,2363  54 042 0            TS      Q-RHCCTR
 0213   REF   1             23,2364  54 044 0            TS      R-RHCCTR
 0214   REF   1             23,2365  3 3111 0            CA      BITS8,9         ENABALE COUNTERS, START READING
 0215                       23,2366  0 0006 1            EXTEND
 0216                       23,2367  05 013 0            WOR     13
 0217   REF   1             23,2370  1 2421 0            TCF     OBEYRATE
R0218   •••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••
 0219   REF  25 LAST 547    23,2371  24 765 0  JUSTOUT   INCR    DAPBOOLS        ALWAYS SETS BIT1 ON RATE COMMAND BIT
 0220   REF  27 LAST 469    23,2372  3 7656 0            CAF     BIT2
 0221                       23,2373  0 0006 1            EXTEND
 0222                       23,2374  02 030 0            RAND    30
 0223                       23,2375  0 0006 1            EXTEND
 0224                       23,2376  1 2403 0            BZF     +5              BRANCH FOR ASCENT CONSTANTS

 0225   REF   1             23,2377  3 3076 0            CAF     -D2JTLIM        -1.4 DEG/SEC SCALED AT PI/4
 0226   REF   1             23,2400  55'507 0            TS      -2JETLIM
 0227   REF   1             23,2401  3 3075 0            CAF     -DRATEDB        -0.4 DEG/SEC SCALED AT PI/4
 0228                       23,2402  1 2406 0            TCF     +4

 0229   REF   1             23,2403  3 3077 1  +5        CAF     -A2JTLIM        -2.0 DEG/SEC SCALED AT PI/4
 0230   REF   2 LAST 548    23,2404  55'507 0            TS      -2JETLIM
 0231   REF   1             23,2405  3 3100 0            CAF     -ARATEDB        -1.0 DEG/SEC SCALED AT PI/4
 0232   REF   2 LAST 547    23,2406  55'506 1  +4        TS      -RATEDB

 0233   REF 199 LAST 548    23,2407  3 7665 0            CAF     ZERO            ZERO COUNTERS
 0234   REF   3 LAST 548    23,2410  54 043 1            TS      P-RHCCTR
 0235   REF   2 LAST 548    23,2411  54 042 0            TS      Q-RHCCTR
 0236   REF   2 LAST 548    23,2412  54 044 0            TS      R-RHCCTR
 0237   REF   2 LAST 548    23,2413  3 3111 0            CA      BITS8,9
 0238                       23,2414  0 0006 1            EXTEND
 0239                       23,2415  05 013 0            WOR     13
 0240   REF   6 LAST 547    23,2416  1 2612 1            TCF     JETSOFF
R0241   •••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••••
 0242   REF 200 LAST 548    23,2417  3 7665 0  JOEY      CAF     ZERO
 0243   REF   2 LAST 548    23,2420  55'441 0            TS      PRATECOM

R0244   IN THIS SECTION P RATE ERROR IS COMPUTED AND T-JET IS CALCULATED

 0245   REF   9 LAST 547    23,2421  4 1416 1  OBEYRATE  CS      OMEGAP
 0246   REF   3 LAST 548    23,2422  6 1441 1            AD      PRATECOM
 0247   REF   2 LAST 546    23,2423  55'440 1            TS      TPSIG           SIGN STORAGE TO TELL DIRECTION OF ROT.
 0248   REF 338 LAST 544    23,2424  10 000 0  OBEYRAPE  CCS     A               GET ABVAL OF RATE P-ERROR
 0249                       23,2425  1 2431 1              TCF     +4
 0250  REF   7 LAST 548     23,2426  1 2612 1              TCF     JETSOFF
 0251                       23,2427  1 2431 1              TCF     +2
 0252  REF   8 LAST 549     23,2430  1 2612 1              TCF     JETSOFF
 0253  REF  44 LAST 547     23,2431  6 7657 1              AD      BIT1
 0254  REF   1              23,2432  55'472 0              TS      PRATEDIF          ABVAL OF RATE ERROR SCALED AT PI/4

 0255  REF   3 LAST 544     23,2433  0 4177 1              TC      T6JOBCHK          T6JOBCHK IS IN FIXED-FIXED

 0256  REF   3 LAST 548     23,2434  3 1506 0              CA      -RATEDB
 0257  REF   2 LAST 549     23,2435  6 1472 1              AD      PRATEDIF
 0258                       23,2436  0 0006 1              EXTEND
 0259  REF   9 LAST 549     23,2437  6 2612 0              BZMF    JETSOFF           RATE ERROR INSIDE DEADBAND

 0260  REF   3 LAST 549     23,2440  4 1472 0              CS      PRATEDIF
 0261                       23,2441  0 0006 1              EXTEND
 0262  REF   3 LAST 548     23,2442  61'507 1              SU      -2JETLIM
 0263                       23,2443  0 0006 1              EXTEND
 0264  REF   1              23,2444  6 2537 1              BZMF    RCM4JETS

 0265  REF   4 LAST 549     23,2445  3 1472 1              CA      PRATEDIF          2 JETS ENOUGH.COMPUTE TJET
 0266                       23,2446  0 0006 1              EXTEND
 0267  REF   1              23,2447  7 1444 0              MP      1/2JTSP           1/2JTACC SCALED AT 2EXP(8)/PI
 0268                       23,2450  0 0006 1              EXTEND
 0269  REF  34 LAST 546     23,2451  7 7654 0              MP      BIT4
 0270  REF 183 LAST 548     23,2452  3 0001 0              CA      L
 0271                       23,2453  0 0006 1              EXTEND
 0272  REF   1              23,2454  7 3101 0              MP      25/32             A CONTAINS TJET SCALED AT 2EXP(4)(16/25)
 0273  REF   6 LAST 545     23,2455  55'625 0              TS      TP

R0274  ......................................................................
R0275  CHECK RATE COMMAND ON TIME AGAINST MINIMUM IMPULSE
 0276  REF   2 LAST 545     23,2456  55'505 1              TS      TOFJTCHG
 0277  REF   2 LAST 545     23,2457  6 3102 1              AD      -TJMINT6
 0278                       23,2460  0 0006 1              EXTEND              AS TP. TEST JET TIME. IS IT GREATER OR
 0279  REF  10 LAST 549     23,2461  6 2612 0              BZMF    JETSOFF         LESS THAN A MINIMUM IMPULSE
R0280  ......................................................................
R0281             2-JET JET SELECT LOGIC
R0282  READ CHANNEL 6 TO SEE WHAT THE CURRENT STATE OF THE P JETS IS AND
R0283      CORRECT THE JET TIME FOR THE PROPER AMOUNT OF TIME .
 0284                       23,2462  0 0006 1  2PJETS      EXTEND                  WHAT IS THE CURRENT STATE OF THE P JETS.
 0285                       23,2463  00 006 1              READ    6
 0286                       23,2464  0 0006 1              EXTEND
 0287  REF   1              23,2465  1 2471 0              BZF     PJETSNOT
 0288  REF   1              23,2466  3 3067 0              CA      MCOMPT            - COMPUTATION TIME FOR THE PAXIS
 0289  REF   3 LAST 549     23,2467  27'505 1              ADS     TOFJTCHG          ALTER JET OFF TIME PER STATE OF CH 6.
 0290  REF   1              23,2470  1 2500 1              TCF     TESTSIGN
 0291  REF   1              23,2471  3 3070 0  PJETSNOT    CA      14-TJMIN          TOTAL DELAY FOR A MIN IMP TO FULL ON.
 0292  REF   4 LAST 549     23,2472  27'505 1              ADS     TOFJTCHG          ALTER JET OFF TIME PER STATE OF CH 6.
R0293  ......................................................................
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R0294   SET UP THE ALTERNATING P SELECT BIT IN DAPBOOLS.
 0295   REF  21 LAST 545     23,2473  3 7653 0  ALTPSELT CA     BIT5            COMPLEMENT BIT5 OF DAPBOOLS
 0296   REF  26 LAST 548     23,2474  22 765 0           LXCH   DAPBOOLS
 0297                        23,2475  0 0006 1           EXTEND
 0298   REF 184 LAST 549     23,2476  06 001 0           RXOR   L
 0299   REF  27 LAST 550     23,2477  54 765 1           TS     DAPBOOLS
 0300   REF   3 LAST 548     23,2500  11'440 1  TESTSIGN CCS    TPSIG
 0301   REF  22 LAST 550     23,2501  3 7653 0           CA     BIT5
 0302                        23,2502  1 2504 0           TCF    +2
 0303   REF   1              23,2503  1 2521 1           TCF    NEGTP

 0304   REF  28 LAST 550     23,2504  7 0765 1           MASK   DAPBOOLS        IN THE DAP BOOLS WORD.
 0305                        23,2505  0 0006 1           EXTEND
 0306   REF   1              23,2506  1 2514 1           BZF    ALTPOS1
 0307   REF   1              23,2507  3 7664 1  ALTPOS2  CA     POSPJET1
 0308   REF   2 LAST  33     23,2510  0 4222 1           TC     WRITEJTS +2
 0309   REF  15 LAST 548     23,2511  3 7647 0           CA     BIT9              NOW. ZERO AT CHG.(WRITE LOW8 IN CH.6).
 0310   REF   1              23,2512  55'502 0           TS     JTSATCHG        STATE OF P AXIS JETS AFTER THE T6 RUPT.
 0311   REF   1              23,2513  1 2676 0           TCF    P+2JET
 0312   REF   1              23,2514  3 3110 1  ALTPOS1  CA     POSPJET0
 0313   REF   3 LAST 550     23,2515  0 4222 1           TC     WRITEJTS +2
 0314   REF  16 LAST 550     23,2516  3 7647 0           CA     BIT9              NOW. ZERO AT CHG.(WRITE LOW8 IN CH.6).
 0315   REF   2 LAST 550     23,2517  55'502 0           TS     JTSATCHG        JTSONNOW CONTAINS BITS WRITTEN INTO CH 6
 0316   REF   2 LAST 550     23,2520  1 2676 0           TCF    P+2JET
R0317   ...........................................................................
R0318   TEST DAPBOOLS TO DETERMINE WHICH JET PAIR TO USE FOR P AXIS ROTATION.
 0319   REF  23 LAST 550     23,2521  3 7653 0  NEGTP    CA     BIT5
 0320   REF  29 LAST 550     23,2522  7 0765 1           MASK   DAPBOOLS        IN THE DAP BOOLS WORD.
 0321                        23,2523  0 0006 1           EXTEND
 0322   REF   1              23,2524  1 2532 0           BZF    ALTNEG1
 0323   REF   1              23,2525  3 3107 1  ALTNEG2  CA     NEGPJET1
 0324   REF   4 LAST 550     23,2526  0 4222 1           TC     WRITEJTS +2
 0325   REF  17 LAST 550     23,2527  3 7647 0           CA     BIT9              NOW. ZERO AT CHG.(WRITE LOW8 IN CH.6).
 0326   REF   3 LAST 550     23,2530  55'502 0           TS     JTSATCHG        STATE OF P AXIS JETS AFTER THE T6 RUPT.
 0327   REF   1              23,2531  1 2700 0           TCF    P-2JET
 0328   REF   1              23,2532  3 3106 0  ALTNEG1  CA     NEGPJET0
 0329   REF   5 LAST 550     23,2533  0 4222 1           TC     WRITEJTS +2
 0330   REF  18 LAST 550     23,2534  3 7647 0           CA     BIT9              NOW. ZERO AT CHG.(WRITE LOW8 IN CH.6).
 0331   REF   4 LAST 550     23,2535  55'502 0           TS     JTSATCHG        STATE OF P AXIS JETS AFTER THE T6 RUPT.
 0332   REF   2 LAST 550     23,2536  1 2700 0           TCF    P-2JET
 0333   REF   5 LAST 549     23,2537  3 1472 1  RCM4JETS CA     PRATEDIF
 0334                        23,2540  0 0006 1           EXTEND
 0335   REF   2 LAST 549     23,2541  7 1444 0           MP     1/2JTSP
 0336                        23,2542  0 0006 1           EXTEND
 0337   REF  18 LAST 545     23,2543  7 7655 1           MP     BIT3
 0338   REF 185 LAST 550     23,2544  3 0001 0           CA     L
 0339                        23,2545  0 0006 1           EXTEND
 0340   REF   2 LAST 549     23,2546  7 3101 0           MP     25/32           A NOW CONTAINS TJET SCALED AT 2EXP(4)(16
 0341   REF   7 LAST 549     23,2547  55'625 0           TS     TP              /25).
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R0342      ...............................................................................
R0343      IN THIS SECTION DO THE P AXIS  JET SELECT LOGIC FOR 4 JETS
 0344      REF   5 LAST 549   23,2550  55'505 1  4PJETS   TS      TOFJTCHG          TOFJTCHG WILL BE MODIFIED AND WILL = T6.
 0345      REF   4 LAST 550   23,2551  4 1440 1           CS      TPSIG
 0346                         23,2552  0 0006 1           EXTEND
 0347      REF   1            23,2553  6 2573 1           BZMF    POS4P
 0348                         23,2554  0 0006 1           EXTEND
 0349                         23,2555  00 006 1           READ    6
 0350                         23,2556  0 0006 1           EXTEND
 0351                         23,2557  1 2563 1           BZF     +4
 0352      REF   2 LAST 549   23,2560  3 3067 0           CA      MCOMPT
 0353      REF   6 LAST 551   23,2561  27'505 1           ADS     TOFJTCHG          ALTER JET OFF TIME PER STATE OF CH 6.
 0354                         23,2562  1 2565 1           TCF     +3
 0355      REF   2 LAST 549   23,2563  3 3070 0  +4       CAF     14-TJMIN
 0356      REF   7 LAST 551   23,2564  27'505 1           ADS     TOFJTCHG          ALTER JET OFF TIME PER STATE OF CH 6.
 0357      REF   1            23,2565  3 3105 0           CA      4NEGPJET
 0358      REF   6 LAST 550   23,2566  0 4222 1           TC      WRITEJTS +2
 0359      REF  19 LAST 550   23,2567  3 7647 0           CA      BIT9              THE LOW 8 BITS ONLY GET WRITTEN INTO CH.
 0360      REF   5 LAST 550   23,2570  55'502 0           TS      JTSATCHG          STATE OF P AXIS JETS AFTER THE T6 RUPT.
 0361      REF  20 LAST 510   23,2571  4 7655 1           CS      FOUR
 0362      REF   1            23,2572  1 2701 1           TCF     RATE
 0363                         23,2573  0 0006 1  POS4P    EXTEND
 0364                         23,2574  00 006 1           READ    6
 0365                         23,2575  0 0006 1           EXTEND
 0366                         23,2576  1 2602 0           BZF     +4
 0367      REF   3 LAST 551   23,2577  3 3067 0           CA      MCOMPT
 0368      REF   8 LAST 551   23,2600  27'505 1           ADS     TOFJTCHG          ALTER JET OFF TIME PER STATE OF CH 6.
 0369                         23,2601  1 2604 0           TCF     +3
 0370      REF   3 LAST 551   23,2602  3 3070 0  +4       CA      14-TJMIN          TOTAL DELAY FOR A MIN IMP TO FULL ON.
 0371      REF   9 LAST 551   23,2603  27'505 1           ADS     TOFJTCHG          ALTER JET OFF TIME PER STATE OF CH 6.
 0372      REF   1            23,2604  3 3104 1           CA      4POSPJET
 0373      REF   7 LAST 551   23,2605  0 4222 1           TC      WRITEJTS +2
 0374      REF  20 LAST 551   23,2606  3 7647 0           CA      BIT9                NOW, ZERO AT CHG.(WRITE LOW8 IN CH.6).
 0375      REF   6 LAST 551   23,2607  55'502 0           TS      JTSATCHG          STATE OF P AXIS JETS AFTER THE T6 RUPT.
 0376      REF  21 LAST 551   23,2610  3 7655 0           CA      FOUR
 0377      REF   2 LAST 551   23,2611  1 2701 1           TCF     RATE
 0378      REF 201 LAST 548   23,2612  3 7665 0  JETSOFF  CAF     ZERO
 0379      REF   8 LAST 545   23,2613  55'615 0           TS      JETRATE
 0380      REF  10 LAST 551   23,2614  55'505 1           TS      TOFJTCHG
 0381      REF   8 LAST 551   23,2615  0 4222 1           TC      WRITEJTS +2
 0382      REF  17 LAST 545   23,2616  1 4606 1           TCF     RESUME
R0385      P-AXIS URGENCY FUNCTION CALCULATION

R0386      (NOTE -- M13 = 1 IDENTICALLY IMPLIES NULL MULTIPLICATION.)

 0387      REF  11 LAST 547   23,2617  3 0033 1  PURGENCY CA      CDUY              P-ERROR CALCULATION
 0388                         23,2620  0 0006 1           EXTEND
 0389      REF   2 LAST 547   23,2621  20 775 0           MSU     CDUYD             CDU VALUE - ANGLE DESIRED (Y-AXIS)
 0390                         23,2622  0 0006 1           EXTEND
 0391      REF   5 LAST 544   23,2623  7 1404 1           MP      M11               (CDUY-CDUYD)M11 SCALED AT PI RADIANS
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L      @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                       USER'S OWN PAGE NO.  11

 0392  REF    3 LAST 535     23,2624  57'411 1             XCH      E           SAVE FIRST TERM (OF TWO)
 0393  REF   28 LAST 547     23,2625  3 0032 0             CA       CDUX        THIRD COMPONENT
 0394                        23,2626  0 0006 1             EXTEND
 0395  REF    5 LAST 547     23,2627  20 774 1             MSU      CDUXD       CDU VALUE - ANGLE DESIRED (X-AXIS)
R0396                                                      EXTEND
R0397                                                      MP       M13
 0398  REF    4 LAST 552     23,2630  27'411 0             ADS      E           SAVE SUM OF TERMS, NO OVERFLOW EVR

 0399  REF    6 LAST 543     23,2631  55'476 1             TS       PERROR      SAVE P ERR FOR DISPLAY
 0400  REF    3 LAST 550     23,2632  31'444 1             CAE      1/2JTSP     SET-UP FOR URGENCY SUBROUTINE
 0401  REF    1              23,2633  55'471 0             TS       1/NJETAC

 0402  REF    4 LAST 549     23,2634  0 4177 1             TC       T6JOBCHK    CHECK T6 CLOCK HERE, BEFORE URGROUTN

 0403  REF    3 LAST 535     23,2635  4 1426 1             CS       OMEGAPD
 0404  REF   10 LAST 548     23,2636  6 1416 0             AD       OMEGAP
 0405  REF    3 LAST 535     23,2637  55'423 1             TS       EDOTP
 0406  REF    3 LAST 197     23,2640  0 4156 1             TC       IBNKCALL    *** SUBROUTINE CALL *** (TAKES 24 MCTS)
 0407  REF    1              23,2641   51525 1             CADR     URGROUTN    (RETURN TAKES 10 MCTS)

 04071                       23,2642  0 0006 1             EXTEND               IF URGENCY = 0, FIRE NO JETS
 04072 REF   11 LAST 549     23,2643  1 2612 1             BZF      JETSOFF     (FOR EFFICIENCY ONLY)

 0408  REF  339 LAST 548     23,2644  10 000 0             CCS      A           URGENCY FUNCTION IS IN A, GET ABVAL
 0409  REF    1              23,2645  6 3112 0             AD       UPM
 0410                        23,2646  1 2650 1             TCF      +2
 0411  REF    2 LAST 552     23,2647  6 3112 0             AD       UPM
 0412                        23,2650  0 0006 1             EXTEND
 0413  REF    1              23,2651  6 2661 1             BZMF     2JETSP
 0414  REF   32 LAST 500     23,2652  3 7637 1             CA       POSMAX
 0415  REF    1              23,2653  55'470 1             TS       NJET        INDICATE 4 JETS
 0416  REF    4 LAST 552     23,2654  3 1444 1             CA       1/2JTSP
 0417                        23,2655  0 0006 1             EXTEND
 0418  REF   36 LAST 436     23,2656  7 7642 1             MP       BIT14       USE 1/4JETSP
 0419  REF    2 LAST 552     23,2657  55'471 0             TS       1/NJETAC
 0420  REF    1              23,2660  1 2663 1             TCF      T-JETLAW

 0421  REF   33 LAST 552     23,2661  4 7637 0  2JETSP     CS       POSMAX
 0422  REF    2 LAST 552     23,2662  55'470 1             TS       NJET        INDICATE 2 JETS
 0423  REF    5 LAST 552     23,2663  0 4177 1  T-JETLAW   TC       T6JOBCHK    CHECK T6 CLOCK RUPT BEFORE SUBROUTINE

 0424  REF    1              23,2664  3 3114 0             CAF      JETLWADR    TJETLAW CALLING SEQUENCE
 0425  REF    2 LAST 149     23,2665  0 4162 0             TC       ISWCALL
 0426  REF   12 LAST 552     23,2666  1 2612 1             TCF      JETSOFF
 0427  REF    8 LAST 550     23,2667  55'625 0             TS       TP

 0428  REF    3 LAST 552     23,2670  11'470 1             CCS      NJET
 0429  REF    9 LAST 552     23,2671  3 1625 1             CA       TP
 0430  REF    1              23,2672  1 2550 1             TCF      4PJETS
 0431  REF   10 LAST 552     23,2673  3 1625 1             CA       TP
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DICK GRAN SAYS: USE NO URG. FCN. ON PAXIS, USE TJETLAW ONLY!

1. HOW DO WE DETERMINE DIRECTION?

2. HOW DO WE USE TPSIG?

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L       @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                        USER'S OWN PAGE NO.  12

 0432   REF  11 LAST 551    23,2674  55'505 1            TS      TOFJTCHG
 0433   REF   2 LAST 546    23,2675   1 2462 1           TCF     2PJETS

R0434   TORQUE VECTOR RECONSTRUCTION FOR THE P-AXIS

 0435   REF  78 LAST 544    23,2676   3 7656 0 P+2JET    CA      TWO
 0436   REF   3 LAST 551    23,2677   1 2701 1           TCF     RATE
 0437   REF  79 LAST 553    23,2700   4 7656 1 P-2JET    CS      TWO
 0438   REF   2 LAST 545    23,2701  55'624 1  RATE      TS      NO.PJETS         STORE NO. OF P JETS FOR USE LATER.
 0439   REF   1             23,2702   3 1622 0           CA      100MSPTQ         TORQUE FROM A 100 MS JET PULSE SET BY
 0440                       23,2703   0 0006 1           EXTEND                     AOS TASK EVERY 2 SECONDS.
 0441   REF   6 LAST 545    23,2704   7 1627 1           MP      1JACC
 0442                       23,2705   0 0006 1           EXTEND
 0443   REF   3 LAST 553    23,2706   7 1624 1           MP      NO.PJETS
 0444   REF   9 LAST 551    23,2707  23'615 1            LXCH    JETRATE          STORE JET RATE FOR OMEGAP COMPUTATION.
 0445   REF  12 LAST 553    23,2710   4 1505 1           CS      TOFJTCHG
 0446   REF   1             23,2711   6 3065 1           AD      +1.5CSP          USE 150 MS. TO TEST FOR A PAXIS SKIP.
 0447                       23,2712   0 0006 1           EXTEND
 0448   REF  18 LAST 551    23,2713   6 4606 0           BZMF    RESUME           TP GREATER THAN 150MS THEN DO NORMAL P.
 0449   REF   1             23,2714   3 3113 1           CA      PSKIPADR         SET UP A P AXIS SKIP.
 0450   REF   3 LAST 544    23,2715  55'613 0            TS      PJUMPADR
 0451   REF   3 LAST  33    23,2716  10 031 1  JTLST     CCS     TIME6             TEST CURRENT STATE OF T6.
 0452   REF   1             23,2717   1 2742 0           TCF     T6ONNOW           IF T6 IS + THEN CLOCK IS ON.
 0453   REF   1             23,2720   1 2724 0           TCF     T6OFFNOW          IF T6 IS + ZERO THEN T6 MUST BE OFF
 0454   REF   2 LAST 553    23,2721   1 2742 0           TCF     T6ONNOW             SINCE ALL DINC S LEAD TO MINUS ZERO.
 0455   REF   1             23,2722   0 4203 1           TC      T6JOB            WE ARE IN THE UNIQUE STATE WHICH SAYS
 0456   REF   1             23,2723   1 2716 1           TCF     JTLST              A T6 INTERRUPT IS WAITING.DO T6 JOB.
 0457  *REF  13 LAST 553    23,2724   3 1505 0 T6OFFNOW  CA      TOFJTCHG
 0458   REF   4 LAST 553    23,2725  54 031 1            TS      TIME6            WE ARE HERE IF T6 CLOCK IS OFF.
 0459   REF  33 LAST 546    23,2726   3 7641 0           CA      BIT15
 0460                       23,2727   0 0006 1           EXTEND                   TURN CLOCK PULSE FOR T6 ON AND LOAD T6.
 0461                       23,2730  05 013 0            WOR     13
 0462   REF   7 LAST 551    23,2731   3 1502 1           CA      JTSATCHG
 0463   REF   5 LAST  33    23,2732  54 770 0            TS      T6NEXTJT
 0464   REF 202 LAST 551    23,2733   3 7665 0           CA      ZERO
 0465   REF   1             23,2734  57'504 1            XCH     ADDTLT6          SET UP NEXT T6 INTERRUPT AFTER THE
 0466   REF   3 LAST  33    23,2735  54 766 1            TS      T6NEXT             CURRENT ONE IS COMPLETE. ADDTLT6 MAY
 04661 *          DELETE
 0467   REF 203 LAST 553    23,2736   3 7665 0           CA      ZERO               BE ZERO IN WHICH CASE NO MORE T6.
 0468   REF   1             23,2737  57'503 0            XCH     ADDT6JTS
 0469   REF   6 LAST 553    23,2740  54 771 1            TS      T6NEXTJT +1
 0470   REF  19 LAST 553    23,2741   1 4606 1           TCF     RESUME
 0471   REF   4 LAST 553    23,2742  10 766 1  T6ONNOW   CCS     T6NEXT           HERE IF T6 IS NOW ON. SEE IF T6NEXT IS
 0472   REF   1             23,2743   1 3023 1           TCF     T6NXT=+            ZERO OR NOT.
 0473   REF  14 LAST 553    23,2744   4 1505 1           CS      TOFJTCHG         T6NEXT IS NEVER NEGATIVE,
 0474   REF   5 LAST 553    23,2745   6 0031 0           AD      TIME6            A CONTAINS T6 - TJET.
 0475   REF 340 LAST 552    23,2746  10 000 0            CCS     A                TEST SIGN OF A (SAVING THE DIFFERENCE),
 0476   REF 138 LAST 545    23,2747   6 7657 1           AD      ONE
 0477   REF   1             23,2750   1 2765 0           TCF     JTSFIRST         TJET IS LESS THAN T6.
 0478                       23,2751   1 2752 1           NOOP                     IF DIFFERENCE IS NEGATIVE OR ZERO
 0479    REF 139 LAST 553      23,2752  6 7657 1             AD      ONE                      WE ADD 1 SO ZERO CAN NEVER BE IN LIST.
 0480    REF   5 LAST 553      23,2753  54 766 1             TS      T6NEXT
 0481    REF   8 LAST 553      23,2754  3 1502 1             CA      JTSATCHG
 0482    REF   7 LAST 553      23,2755  54 771 1             TS      T6NEXTJT +1            BEGIN SETTING UP JETS IN THE JET LIST.
 0483    REF 204 LAST 553      23,2756  3 7665 0             CA      ZERO
 0484    REF   2 LAST 553      23,2757  57'504 1             XCH     ADDTLT6
 0485    REF   6 LAST 554      23,2760  54 767 0             TS      T6NEXT +1
 0486    REF 205 LAST 554      23,2761  3 7665 0             CA      ZERO
 0487    REF   2 LAST 553      23,2762  57'503 0             XCH     ADDT6JTS
 0488    REF   8 LAST 554      23,2763  54 772 1             TS      T6NEXTJT +2
 0489    REF  20 LAST 553      23,2764  1 4606 1             TCF     RESUME
 0490    REF   7 LAST 554      23,2765  54 766 1  JTSFIRST   TS      T6NEXT                 HERE IF TJET IS LESS THAN T6.
 0491    REF  15 LAST 553      23,2766  3 1505 0             CA      TOFJTCHG
 0492    REF   6 LAST 553      23,2767  54 031 1             TS      TIME6                  SWITCH T6 AND TJET)
 0493    REF   9 LAST 554      23,2770  3 1502 1             CA      JTSATCHG
 0494    REF   9 LAST 554      23,2771  56 770 1             XCH     T6NEXTJT               BEGIN SWITCHING JET WORDS IN JET LIST.
 0495    REF  10 LAST 554      23,2772  54 771 1             TS      T6NEXTJT +1
 0496    REF   3 LAST 554      23,2773  4 1504 0             CS      ADDTLT6
 0497                          23,2774  0 0006 1             EXTEND
 0498    REF  21 LAST 554      23,2775  1 4606 1             BZF     RESUME                 SEE IF AN ADDITIONAL (QR) JET TIME IS
 0499    REF   8 LAST 554      23,2776  6 0766 0             AD      T6NEXT                   REQUIRED.
 04991 *          DELETE THROUGH 04993
 0500    REF 341 LAST 553      23,2777  10 000 0             CCS     A                      IF AN ADDITIONAL T6 IS NEEDEN, COMPARE
 0501    REF 140 LAST 554      23,3000  6 7657 1             AD      ONE                      IT WITH THE CONTENTS OF T6NEXT.
 0502                          23,3001  1 3012 0             TCF     +11
 0503                          23,3002  1 3003 0             NOOP
 0504    REF 141 LAST 554      23,3003  6 7657 1             AD      ONE
 0505    REF   9 LAST 554      23,3004  54 767 0             TS      T6NEXT +1
 0506    REF 206 LAST 554      23,3005  3 7665 0             CA      ZERO
 0507    REF   4 LAST 554      23,3006  55'504 0             TS      ADDTLT6
 0508    REF   3 LAST 554      23,3007  57'503 0             XCH     ADDT6JTS
 0509    REF  11 LAST 554      23,3010  54 772 1             TS      T6NEXTJT +2
 0510    REF  22 LAST 554      23,3011  1 4606 1             TCF     RESUME
 0511    REF  10 LAST 554      23,3012  54 767 0    +11      TS      T6NEXT +1
 0512    REF 207 LAST 554      23,3013  3 7665 0             CA      ZERO
 0513    REF   5 LAST 554      23,3014  57'504 1             XCH     ADDTLT6
 0514    REF  11 LAST 554      23,3015  54 766 1             TS      T6NEXT
 0515    REF 208 LAST 554      23,3016  3 7665 0             CA      ZERO
 0516    REF   4 LAST 554      23,3017  57'503 0             XCH     ADDT6JTS
 0517    REF  12 LAST 554      23,3020  56 771 0             XCH     T6NEXTJT +1
 0518    REF  13 LAST 554      23,3021  54 772 1             TS      T6NEXTJT +2
 0519    REF  23 LAST 554      23,3022  1 4606 1             TCF     RESUME
 0520    REF  16 LAST 554      23,3023  4 1505 1  T6NXT=+    CS      TOFJTCHG
 0521    REF   7 LAST 554      23,3024  6 0031 0             AD      TIME6
 0522    REF  12 LAST 554      23,3025  6 0766 0             AD      T6NEXT
 0523    REF 342 LAST 554      23,3026  10 000 0             CCS     A
 0524    REF 142 LAST 554      23,3027  6 7657 1             AD      ONE
 0525                          23,3030  1 3037 1             TCF     +7
 0526                          23,3031  1 3032 1             NOOP
 0527    REF 143 LAST 554      23,3032  6 7657 1             AD      ONE
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L       @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                      USER'S OWN PAGE NO.  14

 0528   REF  13 LAST 554     23,3033  54 767 0           TS      T6NEXT +1
 0529   REF  10 LAST 554     23,3034  3 1502 1           CA      JTSATCHG
 0530   REF  14 LAST 554     23,3035  54 772 1           TS      T6NEXTJT +2
 0531   REF  24 LAST 554     23,3036  1 4606 1           TCF     RESUME
 0532   REF 186 LAST 550     23,3037  54 001 1   +7      TS      L
 0533   REF  17 LAST 554     23,3040  4 1505 1           CS      TOFJTCHG
 0534   REF   8 LAST 554     23,3041  6 0031 0           AD      TIME6
 0535   REF 343 LAST 554     23,3042  10 000 0           CCS     A
 0536   REF 144 LAST 554     23,3043  6 7657 1           AD      ONE
 0537   REF   1              23,3044  1 3054 1           TCF     JTSB4T6
 0538                        23,3045  1 3046 1           NOOP
 0539   REF 145 LAST 555     23,3046  6 7657 1           AD      ONE
 0540   REF  14 LAST 555     23,3047  54 766 1           TS      T6NEXT
 0541   REF 187 LAST 555     23,3050  3 0001 0           CA      L
 0542   REF  15 LAST 555     23,3051  54 767 0           TS      T6NEXT +1
 0543   REF  11 LAST 555     23,3052  3 1502 1           CA      JTSATCHG
 0544                        23,3053  1 3062 1           TCF     +7
 0545   REF  16 LAST 555     23,3054  56 766 0  JTSB4T6  XCH     T6NEXT
 0546   REF  17 LAST 555     23,3055  54 767 0           TS      T6NEXT +1
 0547   REF  18 LAST 555     23,3056  3 1505 0           CA      TOFJTCHG
 0548   REF   9 LAST 555     23,3057  54 031 1           TS      TIME6
 0549   REF  12 LAST 555     23,3060  3 1502 1           CA      JTSATCHG
 0550   REF  15 LAST 555     23,3061  55 770 1           XCH     T6NEXTJT
 0551   REF  16 LAST 555     23,3062  56 771 0   +7      XCH     T6NEXTJT +1
 0552   REF  17 LAST 555     23,3063  56 772 0           XCH     T6NEXTJT +2
 0553   REF  25 LAST 555     23,3064  1 4606 1           TCF     RESUME
R0741   T-JET LAW FIXED CONSTANTS

 0742                        23,3065   00360 1  +1.5CSP  DEC     +0.01465
 0743                        23,3066   20000 0  ONE-K    DEC     0.50000
 0745                        23,3067   77767 1  MCOMPT   DEC     -0.00049          -5 MS. SCALED AS T6 (P-AXIS COMP TIME).
 0746                        23,3070   00013 0  14-TJMIN DEC     11
 0747                        23,3071   77537 0  NEGCSP1  DEC     -.00977
 0748                        23,3072   37775 0  MS30P    OCTAL   37775
 0749                        23,3073   34362 1  0.88975  DEC     0.88975
 0750                        23,3074   24366 1  16/25    DEC     0.64000
 0751                        23,3075   77555 1  -DRATEDB OCTAL   77555             -0.4 DEG/SEC SCALED AT PI/4 RADIANS/SEC
 0752                        23,3076   77001 0  -D2JTLIM OCTAL   77001             -1.4 DEG/SEC SCALED AT PI/4
 0753                        23,3077   76447 1  -A2JTLIM OCTAL   76447             -2.0 DEG/SEC SCALED AT PI/4
 0754                        23,3100   77223 1  -ARATEDB OCTAL   77223             -1.0 DEG/SEC SCALED AT PI/4
 0755                        23,3101   31000 0  25/32    DEC     .78125
 0756                        23,3102   77763 0  -TJMINT6 DEC     -.00073
 0757                        23,3103   00077 1  DAPLOW6  OCT     00077
 0758                        23,3104   00125 1  4POSPJET OCTAL   125
 0759                        23,3105   00252 1  4NEGPJET OCTAL   252
 0760                        23,3106   00012 1  NEGPJET0 OCTAL   12
 0761                        23,3107   00240 1  NEGPJET1 OCTAL   240
 0762                        23,3110   00120 1  POSPJET0 OCTAL   120
 0763   REF  12 LAST 484                7664  POSPJET1 EQUALS  FIVE
 0764                        23,3111   00600 1  BITS8,9  OCTAL   00600
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L        @P-AXIS REACTION CONTROL SYSTEM AUTOPILOT                                USER'S OWN PAGE NO.  15

 0765                        23,3112   71462 1  UPM      DEC     -.2              TEMPORARY ESTIMATE
 07651  REF    1             23,3113   02147 1  PSKIPADR GENADR  SKIPPAXS
 0766   REF    1             23,3114   52000 0  JETLWADR CADR    TJETLAW


 0767   REF   10 LAST 543    23,3115  22 016 0  SETIDLE  LXCH    BANKRUPT         FIRST T5RUPT AFTER FRESH START COMES
 0768   REF    1             23,3116  3 3357 0           CAF     IDLERADR         HERE, DAPIDLER IS STARTED IN 1 SECOND.
 0769   REF    4 LAST 543    23,3117  54 345 1           TS      T5ADR
 0770   REF    1             23,3120  3 3123 1           CAF     1SECRUPT
 0771   REF    3 LAST 543    23,3121  54 030 0           TS      TIME5
 0772   REF    3 LAST 372    23,3122  1 4610 0           TCF     NOQRSM

 0773                        23,3123   37634 1  1SECRUPT OCTAL   37634            1 SECOND SCALED AS TIME5 (100 PULSES)

 0774                        23,3124  0 0006 1  GOIDLE   EXTEND                   COME HERE TO SHUT DOWN DAP
 0775   REF    1             23,3125  3 3360 1           DCA     GOIDLADR
 0776   REF    5 LAST 556    23,3126  52 346 1           DXCH    T5ADR            SET UP RUPT TO GO IDLE AT DAPIDLER

 0777   REF  209 LAST 554    23,3127  3 7665 0           CAF     ZERO             CLEAR ALL JETS
 0778                        23,3130  0 0006 1           EXTEND
 0779                        23,3131  01 005 0           WRITE   5
 0780                        23,3132  0 0006 1           EXTEND
 0781                        23,3133  01 006 0           WRITE   6

 0782   REF    1             23,3134  4 3140 0           CS      BGIM23           STOP THE TRIM GIMBAL DRIVES
 0783                        23,3135  0 0006 1           EXTEND
 0784                        23,3136  03 012 1           WAND    12

 0785   REF   26 LAST 555    23,3137  1 4606 1           TCF     RESUME

 0786                        23,3140   07400 1  BGIM23   OCTAL   07400
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3635
3140
475

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L       @DAPIDLER PROGRAM                                                                        USER'S OWN PAGE NO.   1

R0001   THE DAPIDLER PROGRAM IS STARTED BY FRESH START AND RESTART.                      THE DAPIDLER PROGRAM IS DONE 10 TIMES
R0003   PER SECOND UNTIL THE ASTRONAUT DESIRES THE DAP TO WAKE UP, AND THE IMU AND CDUS ARE READY FOR USE BY THE DAP.
R0005   THE NECESSARY INITIALIZATION OF THE DAP IS DONE BY THE DAPIDLER PROGRAM.
R0006   ADDITIONAL WORK MUST BE DONE ON DAPIDLER IN THE FUTURE.


 0007   REF  11 LAST 556     23,3141  22 016 0  DAPIDLER LXCH    BANKRUPT         INTERRUPT LEAD IN (CONTINUED)
 0008                        23,3142  0 0006 1           EXTEND
 0009   REF  10 LAST 543     23,3143  22 012 1           QXCH    QRUPT

 0010   REF  37 LAST 503     23,3144  3 7652 1           CAF     BIT6
 0011   REF  58 LAST 364     23,3145  7 0367 1           MASK    IMODES30
 0012   REF 344 LAST 555     23,3146  10 000 0           CCS     A
 0013   REF   1              23,3147  1 3354 1           TCF     MOREIDLE

 0014   REF  35 LAST 549     23,3150  3 7654 1           CAF     BIT4
 0015   REF  24 LAST 550     23,3151  6 7653 0           AD      BIT5
 0016                        23,3152  0 0006 1           EXTEND
 0017                        23,3153  02 012 0           RAND    12
 0018   REF 345 LAST 557     23,3154  10 000 0           CCS     A
 0019   REF   2 LAST 557     23,3155  1 3354 1           TCF     MOREIDLE

 0020   REF  44 LAST 545     23,3156  3 7646 1           CAF     BIT10            BIT10 OF 30 IS PNGCS CONTROL OF S/C
 0021                        23,3157  0 0006 1           EXTEND
 0022                        23,3160  02 030 0           RAND    30               BITS IN 30 ARE INVERTED
 0023   REF 346 LAST 557     23,3161  10 000 0           CCS     A
 0024   REF   3 LAST 557     23,3162  1 3354 1           TCF     MOREIDLE

 0025   REF  25 LAST 547     23,3163  3 7643 1           CAF     BIT13            ATTITUDE HOLD BIT. INVERTED.
 0026                        23,3164  0 0006 1           EXTEND
 0027                        23,3165  02 031 1           RAND    31
 0028                        23,3166  0 0006 1           EXTEND
 0029   REF   1              23,3167  1 3175 0           BZF     STARTDAP

 0030   REF  37 LAST 552     23,3170  3 7642 0           CA      BIT14
 0031                        23,3171  0 0006 1           EXTEND
 0032                        23,3172  02 031 1           RAND    31
 0033   REF 347 LAST 557     23,3173  10 000 0           CCS     A
 0034   REF   4 LAST 557     23,3174  1 3354 1           TCF     MOREIDLE

 0035   REF 210 LAST 556     23,3175  3 7665 0  STARTDAP CAF     ZERO
 0036   REF  10 LAST 555     23,3176  54 031 1           TS      TIME6
 0037   REF   1              23,3177  55'545 0           TS      TIMEOFFQ
 0038   REF   1              23,3200  55'546 0           TS      TIMEOFFR
 0039   REF   2 LAST 542     23,3201  55'473 1           TS      LASTPER
 0040   REF   1              23,3202  55'474 0           TS      LASTQER
 0041   REF   1              23,3203  55'475 1           TS      LASTRER
 0042   REF   7 LAST 552     23,3204  55'476 1           TS      PERROR           INITIALIZE TEMPS FOR ATT ERROR DISPLAY
 0043   REF   2 LAST 538     23,3205  55'477 0           TS      QERROR
```

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L      @DAPIDLER PROGRAM                                                         USER'S OWN PAGE NO.   2

 0044   REF    2 LAST  538     23,3206   55'500 1          TS         RERROR
 0045   REF   18 LAST  555     23,3207   54 766 1          TS         T6NEXT
 0046   REF   19 LAST  558     23,3210   54 767 0          TS         T6NEXT +1
 0047   REF    6 LAST  546     23,3211   54 773 0          TS         DELAYCTR
 0048   REF   10 LAST  553     23,3212   55'615 0          TS         JETRATE
 0049   REF    1               23,3213   55'616 0          TS         JETRATEQ
 0050   REF    1               23,3214   55'617 1          TS         JETRATER
 00501  REF    3 LAST  540     23,3215   55'642 1          TS         AOSQTERM
 00502  REF    2 LAST  188     23,3216   55'643 0          TS         AOSRTERM
 0051   REF    1               23,3217   55'512 1          TS         CH5MASK
 0052   REF    1               23,3220   55'513 0          TS         CH6MASK
 0053   REF    3 LAST  544     23,3221   54 066 0          TS         DELTAP
 0054   REF   11 LAST  552     23,3222   55'416 1          TS         OMEGAP
 0055   REF    2 LAST  187     23,3223   55'417 0          TS         OMEGAQ
 0056   REF    2 LAST  187     23,3224   55'421 0          TS         OMEGAR
 0057   REF    4 LAST  552     23,3225   55'426 1          TS         OMEGAPD
 0058   REF    1               23,3226   55'427 0          TS         OMEGAQD
 0059   REF    1               23,3227   55'430 0          TS         OMEGARD
 0060   REF    1               23,3230   55'626 0          TS         TQR                 TS       (1-K)QR
 0061   REF    2 LAST  539     23,3231   55'620 0          TS         NO.QJETS                     (1-K)/8
 0062   REF    1               23,3232   55'621 1          TS         NO.RJETS
 0065   REF    1               23,3233   3 3375 0          CAF        0.62170
 0066   REF    1               23,3234   55'464 1          TS         4JETTORK
 0067   REF    1               23,3235   3 3377 1          CAF        .68387           2200 FT LBS. SCALED AT 2(10) X PI.
 0068   REF    1               23,3236   55'465 0          TS         JETTORK4         QR AXIS JET TORQUE FOR 4 JETS.
 0069   REF   29 LAST  552     23,3237   3 0032 0          CA         CDUX
 0070   REF    6 LAST  543     23,3240   55'431 1          TS         OLDXFORP
 0071   REF    6 LAST  552     23,3241   54 774 1          TS         CDUXD
 0072   REF   12 LAST  551     23,3242   3 0033 1          CA         CDUY
 0073   REF    3 LAST  543     23,3243   55'432 1          TS         OLDYFORP
 0074   REF    1               23,3244   55'433 0          TS         OLDYFORQ
 0075   REF    3 LAST  551     23,3245   54 775 0          TS         CDUYD
 0076   REF   15 LAST  547     23,3246   3 0034 0          CA         CDUZ
 0077   REF    1               23,3247   55'434 1          TS         OLDZFORQ
 0078   REF    3 LAST  547     23,3250   54 776 0          TS         CDUZD
 0079   REF   38 LAST  557     23,3251   3 7652 1          CAF        BIT6             ENABLE CDU ERR CNTR FOR ATT ERROR DISPLA
 0080                          23,3252   0 0006 1          EXTEND
 0081                          23,3253   05 012 1          WOR        12

 008102 REF    2 LAST  544     23,3254   3 3361 0          CA         VISFZADR
 008104 REF    4 LAST  553     23,3255   55'613 0          TS         PJUMPADR
 0082  *REF    1               23,3256   3 3410 1          CA         .075DEC          INITIALIZE 100 MS JET PULSE TORQUE TERMS
 0083  *REF    2 LAST  553     23,3257   55'622 1          TS         100MSPTQ           TO VALUES WHEN K = 1/2.
 00831 *REF    1               23,3260   55'623 0          TS         QR.ISTOQ         AOSTASK MUST VARY THESE AS K VARIES.
R00832 ****** JON ADDELSTON TAKE NOT OF THE ABOVE COMMENT - DICK GRAN.
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L       @DAPIDLER PROGRAM                                                                USER'S OWN PAGE NO.   3

 0125   REF    1                  23,3261   3 3400 0           CA       10AT16
 0126   REF    4 LAST 545         23,3262   55'655 1           TS       WFORP
 0127   REF    1                  23,3263   3 3401 1           ~~CA       6.0AT16~~
 0128   REF    1                  23,3264   55'656 1           TS       WFORQR

 0129   REF 146 LAST 555          23,3265   3 7657 1           CAF      ONE
 0130   REF  77 LAST 527          23,3266   0 4536 0           TC       WAITLIST
 0131                             23,3267    03525 0           2CADR    IXXTASK
C0131   REF    2 LAST 188         23,3270    52006 0
 0132   REF 147 LAST 559          23,3271   3 7657 1           CA       ONE
 0133   REF  78 LAST 559          23,3272   0 4536 0           TC       WAITLIST
 0134                             23,3273    03536 1           2CADR    IYYTASK
C0134   REF    2 LAST 188         23,3274    52006 0
 0135   REF 148 LAST 559          23,3275   3 7657 1           CA       ONE
 01351  REF  79 LAST 559          23,3276   0 4536 0           TC       WAITLIST
 01352                            23,3277    03547 1           2CADR    IZZTASK
C01352  REF    2 LAST 188         23,3300    52006 0
R0136   THIS SECTION COMPUTES THE RATE OF CHANGE OF ACCELERATION DUE TO THE
R0137     ROTATION OF THE GIMBAL ENGINE. THE EQUATION IMPLEMENTED IN BOTH THE
R0138     Y-X PLANE AND THE Z-X PLANE IS -- D(ALPHA)/DT = T L/I * D(DELTA)/DT
R0139     WHERE ----
R0140                T = ENGINE THRUST COMMAND
R0141                L = PIVOT TO CG DISTANCE OF THE GIMBAL ENGINE
R0142                I = INERTIA
R0143                DELTA = GIMBAL ENGINE ANGLE MEASURED FROM THE X AXIS.

 0144   REF    1                  23,3301   3 3403 0           CAF      DELTADOT          0.2 DEG/SEC SCALED AT PI/64
 0145                             23,3302   0 0006 1           EXTEND
 0146   REF    1                  23,3303   7 1526 0           MP       L,PVT-CG          GIMBAL PIVOT TO C.G. DISTANCE ,SCALE=8.
 0147                             23,3304   0 0006 1           EXTEND
 0148   REF    1                  23,3305   7 1533 1           MP       THRSTCMD          COMMANDED THRUST SCALED AT 2(14) =16384.
 0149   REF  64 LAST 543          23,3306   52 066 0           DXCH     ITEMP1
 0150                             23,3307   0 0006 1           EXTEND
 0151   REF  65 LAST 559          23,3310   3 0066 1           DCA      ITEMP1
 0152                             23,3311   0 0006 1           EXTEND
 0153   REF    1                  23,3312   11'463 0           DV       IZZ               AT 2(18)
 0154   REF    1                  23,3313   55'543 0           TS       ACCDOTR           AT PI/2(7)
 0155   REF  66 LAST 559          23,3314   52 066 0           DXCH     ITEMP1
 0156                             23,3315   0 0006 1           EXTEND
 0157   REF    1                  23,3316   11'462 1           DV       IYY               AT 2(18)
 0158   REF    4 LAST 538         23,3317   55'541 1           TS       ACCDOTQ           AT PI/2(7)

 0159                             23,3320   0 0006 1           EXTEND                     .3ACCDOTQ AT PI/2(8)
 0160   REF    1                  23,3321   7 3404 0           MP       DGBF
 0161   REF    4 LAST 538         23,3322   55'535 1           TS       KQ
 0162                             23,3323   0 0006 1           EXTEND
 0163                             23,3324   7 0000 0           SQUARE
 0164   REF    1                  23,3325   55'536 1           TS       KQ2               KQ(2)

 0165   REF    2 LAST 559         23,3326   31'543 1           CAE      ACCDOTR           .3ACCDOTR AT PI/2(8)
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GOOD AS IS

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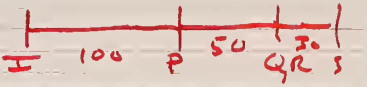
CAF      180 MS
TC       WAITLIST
2CADR    WCHANGER
```



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L     @DAPIDLER PROGRAM                                                       USER'S OWN PAGE NO.   4

 0166                        23,3327  0 0006 1           EXTEND
 0167   REF     2 LAST 559   23,3330  7 3404 0           MP         DGBF
 0168   REF     1            23,3331  55'537 0           TS         KR
 0169                        23,3332  0 0006 1           EXTEND
 0170                        23,3333  7 0000 0           SQUARE
 0171   REF     1            23,3334  55'540 0           TS         KR2

 0179   REF     1            23,3335  3 3406 0           CAF        .5ACCMIN
 0180   REF     1            23,3336  55'651 0           TS         .5ACCMNQ        INITIALIZE FOR DESCENT
 0181   REF     1            23,3337  55'652 0           TS         .5ACCMNR
 0182   REF     1            23,3340  55'653 1           TS         .5ACCMNU
 0183   REF     1            23,3341  55'654 0           TS         .5ACCMNV

 0184   REF     5 LAST 540   23,3342  55'650 1           TS         .5ACCMNE        (QUIRK FIX)

 0185   REF     1            23,3343  3 3407 1           CAF        DBMNMP          SET UP DESCENT MINIMUM IMPULSE DEADBANDS
 0186   REF     4 LAST 540   23,3344  55'646 0           TS         DBMINIMP        (DUPLICATES MONITOR FUNCTION)
 0187   REF     3 LAST 187   23,3345  55'647 1           TS         MINIMPDB

 0188                        23,3346  0 0006 1           EXTEND                     SET UP P-AXIS TO GO TO DUMMYFIL
 0189   REF     1            23,3347  3 3372 1           DCA        DF2CADR
 0190   REF     2 LAST 543   23,3350  53'602 0           DXCH       PFILTADR

 0191                        23,3351  0 0006 1           EXTEND
 0192   REF     1            23,3352  3 3370 0           DCA        PAXADIDL
 0193   REF     6 LAST 556   23,3353  52 346 1           DXCH       T5ADR
 0194   REF     1            23,3354  3 3373 0 MOREIDLE  CAF        MS100
 0195   REF     4 LAST 556   23,3355  54 030 0           TS         TIME5
 0196   REF    27 LAST 556   23,3356  1 4606 1           TCF        RESUME
 0197                        23,3357   03141 0 IDLERADR  2CADR      DAPIDLER
C0197   REF     2 LAST 159   23,3360   46006 0
 0198   REF     2 LAST 556             23,3357 GOIDLADR  EQUALS     IDLERADR


 019802 REF     1            23,3361   02213 0 VISFZADR  GENADR     CHKVISFZ
 0199   REF     1            23,3362  3 3402 1 WCHANGER  CA         0.31250         CHANGE WFORP AND WFORQR
 0200   REF     5 LAST 559   23,3363  55'655 1           TS         WFORP           TO REFLECT 100 MS INTERVAL
 0201   REF     2 LAST 559   23,3364  55'656 1           TS         WFORQR          WHICH CAUSES SMOOTHING IN RATE FILTER.
 0202   REF    65 LAST 515   23,3365  1 4602 0           TCF        TASKOVER        BETWEEN 1ST QR AND 2ND P AFTER STARTDAP
 0203                        23,3366   26501 1 .707P     DEC        .70711          SQUARE ROOT OF 1/2
 0204                        23,3367   02055 0 PAXADIDL  2CADR      PAXIS
C0204   REF     1            23,3370   46006 0
 0205                        23,3371   02544 0 DF2CADR   2CADR      DUMMYFIL
C0205   REF     1            23,3372   54006 0
 0206                        23,3373   37766 1 MS100     OCTAL      37766
 0207                        23,3374   00033 1 0.00167   DEC        0.00167
 0208                        23,3375   23712 1 0.62170   DEC        0.62170
 0209                        23,3376   00022 1 180MS     OCTAL      00022           18 BITS
 0212                        23,3377   25705 1 .68387    DEC        0.68387
 0213                    23,3400   24000 1   10AT16    DEC     0.62500
 0214                    23,3401   15146 0   6.6AT16   DEC     0.4125          *** IS THIS NEEDED
 0215                    23,3402   12000 1   0.31250   DEC     0.31250

 0216                    23,3403   02215 0   DELTADOT  DEC     0.07111         0.2 DEG/SEC SCALED AT PI/64
 0217                    23,3404   23146 0   DGBF      DEC     0.6
 0218                    23,3405   70000 0   OCT70000  OCT     70000
 0219                    23,3406   11643 0   .5ACCMIN  DEC     0.30680
 0220                    23,3407   00033 1   DBMNMP    DEC     0.00167         .3 DEGREES SCALED AT PI RADIANS
 0221  *                 23,3410   02315 1   .075DEC   DEC     0.07500          = T(1-K + KT/(2CSP) ) WHEN T = .1,K=.5
 0222                              23,3411   ENDDAP23  EQUALS
```

3633
3411
224
5
231

(1-K) GYR
(1-K)/8

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L       @Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                                     USER'S OWN PAGE NO.   1

 0001                            24,2000                      BANK    24
 0002   REF   4 LAST 542               E6                     EBANK=  DT

R0003   THE FOLLOWING T5RUPT ENTRY BEGINS THE PROGRAM WHICH CONTROLS THE Q,R-AXIS ACTION OF THE LEM USING THE RCS JETS.
R0005   THE NOMINAL TIME BETWEEN THE Q,R-AXIS RUPTS IS 100 MS (UNLESS THE TRIM GIMBAL CONTROL SYSTEM IS USED, IN WHICH
R0007   CASE THIS PROGRAM IS IDLE).

 0008                      24,2000   02555 0  NULLFILT 2CADR   FILDUMMY
C0008   REF   1            24,2001   54006 0
 0009   REF   1            24,2002  3 2705 1  QRAXIS   CAF     MS30QR            RESET TIME IMMEDIATELY: DT = 30 MS
 0010   REF   5 LAST 560   24,2003  54 030 0           TS      TIME5

 0011   REF  12 LAST 557   24,2004  22 016 0           LXCH    BANKRUPT          INTERRUPT LEAD IN (CONTINUED)
 0012                      24,2005  0 0006 1           EXTEND
 0013   REF  11 LAST 557   24,2006  22 012 1           QXCH    QRUPT

R0014   SET UP A DUMMY KALMAN FILTER T5RUPT.  (THIS MAY BE RESET TO THE KALMAN FILTER INITIALIZATION PASS, IF THE TRIM
R0016   GIMBAL CONTROL SYSTEM SHOULD BE USED.)

 0017                      24,2007  0 0006 1           EXTEND
 0018   REF   1            24,2010  3 2001 1           DCA     NULLFILT
 0019   REF   7 LAST 560   24,2011  52 346 1           DXCH    T5ADR

R0020   CALCULATE LEM BODY RATES FOR Q AND R AXES:

R0021   THIS COMPUTATION IS VALID FOR BOTH ASCENT AND DESCENT SINCE THE OFFSET ACCELERATION TERM IS INCLUDED ALWAYS,
R0023   BUT HAS VALUE ZERO IN DESCENT, AND SINCE THE WEIGHTING FACTORS ARE IN ERASABLE AND DISTINCT.

R0025   FIRST, CONSTRUCT Y AND Z CDU INCREMENTS:

 0026   REF  13 LAST 558   24,2012  30 033 1           CAE     CDUY              2'S COMPLEMENT MEASUREMENT SCALED AT PI
 0027   REF 188 LAST 555   24,2013  54 001 1           TS      L                 (SAVE FOR UPDATING OF OLDYFORQ)
 0028                      24,2014  0 0006 1           EXTEND                    FORM INCREMENT IN CDUY FOR LAST 100 MS
 0029   REF   2 LAST 558   24,2015  21'433 0           MSU     OLDYFORQ          (100 MS OLD CDUY SAVED FROM LAST PASS)
 0030   REF   3 LAST 562   24,2016  23'433 1           LXCH    OLDYFORQ          UPDATE OLDYFORQ WITH NEW CDUY VALUE
 0031                      24,2017  0 0006 1           EXTEND                    RESCALE DELTA CDUY FROM PI RADIANS TO
 0032   REF  30 LAST 544   24,2020  7 7651 0           MP      BIT7              PI/2(6) RADIANS BY MULTIPLYING BY 64
 0033   REF  67 LAST 559   24,2021  22 065 1           LXCH    ITEMP1            SAVE 1'S COMPLEMENT VALUE TEMPORARILY
 0034   REF  16 LAST 558   24,2022  30 034 0           CAE     CDUZ              2'S COMPLEMENT MEASUREMENT SCALED AT PI
 0035   REF 189 LAST 562   24,2023  54 001 1           TS      L                 (SAVE FOR UPDATING OF OLDZFORQ)
 0036                      24,2024  0 0006 1           EXTEND                    FORM INCREMENT IN CDUZ FOR LAST 100 MS
 0037   REF   2 LAST 558   24,2025  21'434 1           MSU     OLDZFORQ          (100 MS OLD CDUZ SAVED FROM LAST PASS)
 0038   REF   3 LAST 562   24,2026  23'434 0           LXCH    OLDZFORQ          UPDATE OLDZFORQ WITH NEW CDUZ VALUE
 0039                      24,2027  0 0006 1           EXTEND                    RESCALE DELTA CDUZ FROM PI RADIANS TO
 0040   REF  31 LAST 562   24,2030  7 7651 0           MP      BIT7              PI/2(6) RADIANS BY MULTIPLYING BY 64
 0041   REF  24 LAST 538   24,2031  22 066 1           LXCH    ITEMP2            SAVE 1'S COMPLEMENT VALUE TEMPORARILY
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L       @Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                                     USER'S OWN PAGE NO.   2

P0042   SECOND, TRANSFORM CDU INCREMENTS TO BODY-ANGLE INCREMENTS:

 0043   REF   2 LAST 181     24,2032  31'406 1            CAE     M31             MATRIX*VECTOR(WITH X COMPONENT ZERO)
 0044                        24,2033   0 0006 1            EXTEND
 0045   REF  68 LAST 562     24,2034   7 0065 0            MP      ITEMP1          M31 * ITEMP1 = M31 * DELTA CDUY
 0046   REF  16 LAST 540     24,2035  54 070 1             TS      ITEMP3
 0047   REF   4 LAST 182     24,2036  31'403 1             CAE     M32             M32 * ITEMP2 = M32 * DELTA CDUZ
 0048                        24,2037   0 0006 1            EXTEND
 0049   REF  25 LAST 562     24,2040   7 0066 0            MP      ITEMP2          DELTAR = M31*(DEL CDUY) + M32*(DEL CDUZ)
 0050   REF  17 LAST 563     24,2041  26 070 1             ADS     ITEMP3          R-BODY-ANGLE INCREMENT SCALED AT PI/2(6)

 0051   REF   2 LAST 182     24,2042  31'405 1             CAE     M21             MATRIX*VECTOR(WITH X COMPONENT ZERO)
 0052                        24,2043   0 0006 1            EXTEND                  CLOBBERS ITEMP2=DEL CDUZ, FOR EFFICIENCY
 0053   REF  69 LAST 563     24,2044   7 0065 0            MP      ITEMP1          M21 * ITEMP1 = M21 * DELTA CDUY
 0054   REF  26 LAST 563     24,2045  56 066 1             XCH     ITEMP2          M22 * ITEMP2 = M22 * DELTA CDUZ
 0055                        24,2046   0 0006 1            EXTEND
 0056   REF   5 LAST 182     24,2047   7 1401 1            MP      M22             DELTAQ = M21*(DEL CDUY) + M22*(DEL CDUZ)
 0057   REF  27 LAST 563     24,2050  26 066 0             ADS     ITEMP2          Q-BODY-ANGLE INCREMENT SCALED AT PI/2(6)

R0058   FINALLY, DERIVE Q AND R BODY ANGULAR RATES:

 0059                        24,2051   0 0006 1            EXTEND                  WFORQR IS K/(NOMINAL DT) SCALED AT 16
 0060   REF   3 LAST 560     24,2052   7 1656 1            MP      WFORQR          FORM WEIGHTED VALUE OF MEASURED DATA
 0061   REF   3 LAST 558     24,2053  57'417 1             XCH     OMEGAQ          SAVE AND BEGIN TO WEIGHT VALUE OF OLD W
 0062                        24,2054   0 0006 1            EXTEND                  (1-K) IS SCALED AT 1 FOR EFFICIENT CALC
 0063   REF   2 LAST 540     24,2055   7 1657 0            MP      (1-K)QR         (K CHANGES EVERY 2 SECS IN ASCENT)
 0064   REF   2 LAST 558     24,2056   6 1616 1            AD      JETRATEQ        WEIGHTED TERM DUE TO JET ACCELERATION
 0065   REF   4 LAST 558     24,2057   6 1642 0            AD      AOSQTERM        TERM DUE TO ASCENT OFFSET ACCELERATION
 0066   REF   4 LAST 563     24,2060  27'417 0             ADS     OMEGAQ          TOTAL RATE ESTIMATE SCALED AT PI/4

 0067   REF  18 LAST 563     24,2061  30 070 0             CAE     ITEMP3          GET DELTAR
 0068                        24,2062   0 0006 1            EXTEND                  WFORQR IS K/(NOMINAL DT) SCALED AT 16
 0069   REF   4 LAST 563     24,2063   7 1656 1            MP      WFORQR          FORM WEIGHTED VALUE OF MEASURED DATA
 0070   REF   3 LAST 558     24,2064  57'421 1             XCH     OMEGAR          SAVE AND BEGIN TO WEIGHT VALUE OF OLD W
 0071                        24,2065   0 0006 1            EXTEND                  (1-K) IS SCALED AT 1 FOR EFFICIENT CALC
 0072   REF   3 LAST 563     24,2066   7 1657 0            MP      (1-K)QR         (K CHANGES EVERY 2 SECS IN ASCENT)
 0073   REF   2 LAST 558     24,2067   6 1617 0            AD      JETRATER        WEIGHTED TERM DUE TO JET ACCELERATION
 0074   REF   3 LAST 558     24,2070   6 1643 1            AD      AOSRTERM        TERM DUE TO ASCENT OFFSET ACCELERATION
 0075   REF   4 LAST 563     24,2071  27'421 0             ADS     OMEGAR          TOTAL RATE ESTIMATE SCALED AT PI/4

 007502 REF   1              24,2072   0 1614 0            TC      QJUMPADR
 007504 REF   1              24,2073   3 2164 0  SKIPQRAX  CA      NORMQADR
 007508 REF   2 LAST 563     24,2074  55'614 1             TS      QJUMPADR
 00751  REF 211 LAST 557     24,2075   3 7665 0            CA      ZERO
 007512 REF   3 LAST 563     24,2076  55'616 0             TS      JETRATEQ
 007514 REF   3 LAST 563     24,2077  55'617 1             TS      JETRATER
 007516 REF   2 LAST 558     24,2100   3 1626 1            CA      TQR
 007518 REF   1              24,2101   6 2721 1            AD      NEGCSP2
 00752  REF 348 LAST 557     24,2102  10 000 0             CCS     A
 007522 REF   1              24,2103   0 2113 0            TC      QRTORQUE
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L      @Q.R-AXES REACTION CONTROL SYSTEM AUTOPILOT                                  USER'S OWN PAGE NO.  3

007524 REF  28 LAST 560      24,2104  1 4606 1            TCF     RESUME
007526 REF   2 LAST 563      24,2105  0 2113 0            TC      QRTORQUE
007528 REF   4 LAST 563      24,2106  4 1616 0            CS      JETRATEQ
00753  REF   5 LAST 563      24,2107  27'417 0            ADS     OMEGAQ
007532 REF   4 LAST 563      24,2110  4 1617 1            CS      JETRATER
007534 REF   5 LAST 563      24,2111  27'421 0            ADS     OMEGAR
007536 REF  29 LAST 564      24,2112  1 4606 1            TCF     RESUME
007538 REF 149 LAST 559      24,2113  6 7657 1  QRTORQUE  AD      ONE
00754                        24,2114  0 0006 1            EXTEND
007542 REF  25 LAST 557      24,2115  7 7653 1            MP      BIT5
007544 REF 190 LAST 562      24,2116  3 0001 0            CA      L
007546                       24,2117  0 0006 1            EXTEND
007548 REF   1               24,2120  7 2722 0            MP      16/25QR
00755  REF   3 LAST 563      24,2121  55'626 0            TS      TQR
007552                       24,2122  0 0006 1            EXTEND
007554 REF   3 LAST 558      24,2123  7 1620 0            MP      NO.QJETS
007556 REF 191 LAST 564      24,2124  30 001 0            CAE     L
007558                       24,2125  0 0006 1            EXTEND
00756  REF   1               24,2126  7 1630 1            MP      1JACCQ
007562 REF   5 LAST 564      24,2127  55'616 0            TS      JETRATEQ
007564 REF   3 LAST 540      24,2130  27'640 0            ADS     SUMRATEQ
007566 REF   4 LAST 564      24,2131  31'626 1            CAE     TQR
007568                       24,2132  0 0006 1            EXTEND
00757  REF   2 LAST 558      24,2133  7 1621 1            MP      NO.RJETS
007572 REF 192 LAST 564      24,2134  30 001 0            CAE     L
007574                       24,2135  0 0006 1            EXTEND
007576 REF   1               24,2136  7 1631 0            MP      1JACCR
007578 REF   5 LAST 564      24,2137  55'617 1            TS      JETRATER
00758  REF   2 LAST 187      24,2140  27'641 1            ADS     SUMRATER
007582 REF   5 LAST 563      24,2141  31'656 0            CAE     WFORQR
007584                       24,2142  0 0006 1            EXTEND
007586 REF   5 LAST 564      24,2143  7 1626 0            MP      TQR
007588 REF   1               24,2144  6 1660 0            AD      (1-K)/8
00759                        24,2145  0 0006 1            EXTEND
007593 REF  36 LAST 557      24,2146  7 7654 0            MP      BIT4
007594 REF  70 LAST 563      24,2147  22 065 1            LXCH    ITEMP1
007596 REF   6 LAST 564      24,2150  31'616 1            CAE     JETRATEQ
007598                       24,2151  0 0006 1            EXTEND
0076   REF  71 LAST 564      24,2152  7 0065 0            MP      ITEMP1
007602 REF   7 LAST 564      24,2153  55'616 0            TS      JETRATEQ
007604 REF   6 LAST 564      24,2154  31'617 0            CAE     JETRATER
007606                       24,2155  0 0006 1            EXTEND
007608 REF  72 LAST 564      24,2156  7 0065 0            MP      ITEMP1
00761  REF   7 LAST 564      24,2157  55'617 1            TS      JETRATER
007612 REF 212 LAST 563      24,2160  3 7665 0            CA      ZERO
007614 REF   4 LAST 564      24,2161  55'620 0            TS      NO.QJETS
007616 REF   3 LAST 564      24,2162  55'621 1            TS      NO.RJETS
007618 REF 282 LAST 545      24,2163  0 0002 0            TC      Q
00762  REF   1               24,2164   02165 1  NORMQADR  GENADR  NORMALQ
00763  REF  26 LAST 557      24,2165  3 7643 1  NORMALQ   CAF     BIT13               CHECKING ATTITUDE HOLD BIT
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 0077                        24,2166  0 0006 1             EXTEND
 0078                        24,2167  02 031 1             RAND     31                 BITS INVERTED
 0079                        24,2170  0 0006 1             EXTEND
 0080   REF    1             24,2171  1 2205 0             BZF      CHKBIT10
 0081   REF   38 LAST 557    24,2172  3 7642 0             CAF      BIT14              ATT HOLD BIT NOT PRESENT. CHECK FOR AUTO
 0082                        24,2173  0 0006 1             EXTEND
 0083                        24,2174  02 031 1             RAND     31
 0084                        24,2175  0 0006 1             EXTEND
 0085   REF    1             24,2176  1 2743 1             BZF      ATTSTEER           AUTOMATIC STEERING, CHECK FOR RATE HOLD
 0086                        24,2177  0 0006 1             EXTEND                      IF MODE SELECT SW OFF DO DAPIDLER NEXT
 0087   REF    1             24,2200  3 2204 0             DCA      IDLEADRQ
 0088   REF    8 LAST 562    24,2201  52 346 1             DXCH     T5ADR
 0089   REF   30 LAST 564    24,2202  1 4606 1             TCF      RESUME

 0090                        24,2203    03141 0  IDLEADRQ  2CADR    DAPIDLER
C0090   REF    3 LAST 560    24,2204    46006 0
 0091   REF   45 LAST 557    24,2205  3 7646 1  CHKBIT10  CAF      BIT10              BIT10=1 FOR MIN IMP USE OF RHC
 0092   REF   30 LAST 550    24,2206  7 0765 1             MASK     DAPBOOLS
 0093                        24,2207  0 0006 1             EXTEND
 0094   REF    1             24,2210  1 2250 0             BZF      CHEKSTIK           IN ATT-HOLD/RATE-COMMAND IF BIT10=0

 0095   REF    7 LAST 558    24,2211  30 773 1             CAE      DELAYCTR           SET TO 2 BY RUPT 10
 0096                        24,2212  0 0006 1             EXTEND
 0097   REF    1             24,2213  1 2504 0             BZF      XTRANS

 0098   REF    1             24,2214  3 2713 0             CA       MINTADR
 0099   REF    1             24,2215  55 514 1             TS       TJETADR

 0100   REF   45 LAST 549    24,2216  3 7657 1             CA       BIT1
 0101                        24,2217  0 0006 1             EXTEND
 0102                        24,2220  02 031 1             RAND     31
 0103                        24,2221  0 0006 1             EXTEND
 0104   REF    1             24,2222  1 3453 1             BZF      2JETS+Q

 0105   REF   28 LAST 548    24,2223  3 7656 0             CA       BIT2
 0106                        24,2224  0 0006 1             EXTEND
 0107                        24,2225  02 031 1             RAND     31
 0108                        24,2226  0 0006 1             EXTEND
 0109   REF    1             24,2227  1 3271 1             BZF      2JETS-Q

 0110   REF   26 LAST 564    24,2230  3 7653 0             CA       BIT5
 0111                        24,2231  0 0006 1             EXTEND
 0112                        24,2232  02 031 1             RAND     31
 0113                        24,2233  0 0006 1             EXTEND
 0114   REF    1             24,2234  1 3433 1             BZF      2JETS+R

 0115   REF   39 LAST 558    24,2235  3 7652 1             CA       BIT6
 0116                        24,2236  0 0006 1             EXTEND
 0117                        24,2237  02 031 1             RAND     31
 0118                        24,2240  0 0006 1             EXTEND
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L       @Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                                  USER'S OWN PAGE NO.  5

 0119   REF   1              24,2241  1 3224 1            BZF      2JETS-R

 0120   REF   2 LAST 565     24,2242  1 2504 0            TCF      XTRANS

 0121   REF   1              24,2243  3 2702 0  MINTJET   CAF      +T6TJMIN
 0122   REF   6 LAST 564     24,2244  55'626 0            TS       TQR
 0123   REF 213 LAST 564     24,2245  3 7665 0            CA       ZERO
 0124   REF   8 LAST 565     24,2246  54 773 0            TS       DELAYCTR
 0125   REF   1              24,2247  1 2554 0            TCF      TORQUEV

 0126   REF  34 LAST 553     24,2250  3 7641 0  CHEKSTIK  CAF      BIT15            OUT-OF-DETENT BIT
 0127                        24,2251  0 0006 1            EXTEND
 0128                        24,2252  02 031 1            RAND     31               BITS INVERTED

 0129                        24,2253  0 0006 1            EXTEND
 0130   REF   1              24,2254  1 2317 1            BZF      RHCACTIV         BRANCH IF OUT OF DETENT
 0131   REF  46 LAST 565     24,2255  3 7657 1            CA       BIT1             OUR RATE COMMAND BIT
 0132   REF  31 LAST 565     24,2256  7 0765 1            MASK     DAPBOOLS

 0133                        24,2257  0 0006 1            EXTEND
 0134   REF   2 LAST 565     24,2260  6 2743 0            BZMF     ATTSTEER         AUTOMATIC STEERING, CHECK FOR RATE HOLD
R0135   WE WERE IN RATE COMMAND AND RATES MUST BE MADE SMALLER

R0136    ARE RATES SMALL ENOUGH NOW
 0137   REF  12 LAST 558     24,2261  3 1416 0            CA       OMEGAP
 0138                        24,2262  0 0006 1            EXTEND
 0139                        24,2263  7 0000 0            SQUARE
 0140   REF  73 LAST 564     24,2264  52 066 0            DXCH     ITEMP1

 0141   REF   6 LAST 564     24,2265  3 1417 1            CA       OMEGAQ
 0142                        24,2266  0 0006 1            EXTEND
 0143                        24,2267  7 0000 0            SQUARE
 0144   REF  74 LAST 566     24,2270  20 066 0            DAS      ITEMP1

 0145   REF   6 LAST 564     24,2271  3 1421 1            CA       OMEGAR
 0146                        24,2272  0 0006 1            EXTEND
 0147                        24,2273  7 0000 0            SQUARE
 0148   REF  75 LAST 566     24,2274  20 066 0            DAS      ITEMP1

R0149   WE NOW HAVE SQUARED MAGNITUDE OF RATE VECTOR IN ITEMP1
 0150   REF   1              24,2275  4 2707 1            CS       16/32400         1 DEG/SEC SCALED AT PI.PI/16
 0151   REF  76 LAST 566     24,2276  6 0065 1            AD       ITEMP1
 0152                        24,2277  0 0006 1            EXTEND
 0153   REF   1              24,2300  6 2306 0            BZMF     RATESMAL

R0154               THE RATE IS NOT SMALL ENOUGH YET.

 0155   REF   7 LAST 566     24,2301  3 1417 1            CA       OMEGAQ
 0156   REF   1              24,2302  55'424 0            TS       QRATEDIF
 0157   REF   7 LAST 566     24,2303  3 1421 1            CA       OMEGAR
 0158   REF   1              24,2304  55'425 1            TS       RRATEDIF
 0159   REF   1              24,2305  1 2352 0            TCF      OBEYQRRC

 0160   REF  47 LAST 566     24,2306  4 7657 0  RATESMAL  CS       BIT1
 0161   REF  32 LAST 566     24,2307  7 0765 1            MASK     DAPBOOLS       RATE COMMAND BIT SET TO ZERO
 0162   REF  33 LAST 567     24,2310  54 765 1            TS       DAPBOOLS

 0163   REF  30 LAST 558     24,2311  30 032 0            CAE      CDUX
 0164   REF   7 LAST 558     24,2312  54 774 1            TS       CDUXD
 0165   REF  14 LAST 562     24,2313  30 033 1            CAE      CDUY
 0166   REF   4 LAST 558     24,2314  54 775 0            TS       CDUYD
 0167   REF  17 LAST 562     24,2315  30 034 0            CAE      CDUZ
 0168   REF   4 LAST 558     24,2316  54 776 0            TS       CDUZD

 0169   REF  48 LAST 567     24,2317  3 7657 1  RHCACTIV  CAF      BIT1
 0170   REF  34 LAST 567     24,2320  7 0765 1            MASK     DAPBOOLS
 0171                        24,2321  0 0006 1            EXTEND
 0172   REF   3 LAST 566     24,2322  1 2504 0            BZF      XTRANS         LET P AXIS SET THE RATE COMMAND BIT
R0173   COMPUTE RATE ERRORS
 0174   REF   3 LAST 548     24,2323  30 042 1            CAE      Q-RHCCTR
 0175                        24,2324  0 0006 1            EXTEND
 0176   REF  21 LAST 551     24,2325  7 7647 1            MP       BIT9
 0177   REF   1              24,2326  3 2714 1            CA       -.88975
 0178                        24,2327  0 0006 1            EXTEND
 0179   REF 193 LAST 564     24,2330  7 0001 1            MP       L              -Q RATE COMMAND SCALED AT PI/4
 0180   REF   8 LAST 566     24,2331  6 1417 1            AD       OMEGAQ
 0181   REF   2 LAST 566     24,2332  55'424 0            TS       QRATEDIF

 0182   REF   3 LAST 548     24,2333  30 044 1            CAE      R-RHCCTR
 0183                        24,2334  0 0006 1            EXTEND
 0184   REF  22 LAST 567     24,2335  7 7647 1            MP       BIT9
 0185   REF   2 LAST 567     24,2336  3 2714 1            CA       -.88975
 0186                        24,2337  0 0006 1            EXTEND
 0187   REF 194 LAST 567     24,2340  7 0001 1            MP       L              -R RATE COMMAND SCALED AT PI/4.
 0188   REF   8 LAST 566     24,2341  6 1421 1            AD       OMEGAR
 0189   REF   2 LAST 567     24,2342  55'425 1            TS       RRATEDIF

R0190   ZERO,ENABLE,AND START COUNTERS
 0191   REF 214 LAST 566     24,2343  3 7665 0            CAF      ZERO
 0192   REF   4 LAST 548     24,2344  54 043 1            TS       P-RHCCTR
 0193   REF   4 LAST 567     24,2345  54 042 0            TS       Q-RHCCTR
 0194   REF   4 LAST 567     24,2346  54 044 0            TS       R-RHCCTR
 0195   REF   1              24,2347  3 2710 0            CAF      BIT8,9
 0196                        24,2350  0 0006 1            EXTEND
 0197                        24,2351  05 013 0            WOR      13

 0198   REF   1              24,2352  3 2734 0  OBEYQRRC  CA       RTJETADR
 0199   REF   2 LAST 565     24,2353  55'514 1            TS       TJETADR

 0200   REF   3 LAST 567     24,2354  11'424 0            CCS      QRATEDIF
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0201  REF  1             24,2355  1 2416 1            TCF     POSQEROR
0202  REF  1             24,2356  1 2360 1            TCF     NOQJETS
0203  REF  1             24,2357  1 2365 1            TCF     NEGQEROR

0204  REF  3 LAST 567    24,2360  11'425 1  NOQJETS   CCS     RRATEDIF        CHECK SIGN OF RATE ERROR AND GET ABVAL
0205  REF  1             24,2361  1 2445 1            TCF     R+,CHKDB
0206  REF  4 LAST 567    24,2362  1 2504 0            TCF     XTRANS
0207  REF  1             24,2363  1 2456 0            TCF     R-,CHKDB
0208  REF  5 LAST 568    24,2364  1 2504 0            TCF     XTRANS

0209  REF  4 LAST 549    24,2365  6 1506 0  NEGQEROR  AD      -RATEDB
0210                     24,2366  0 0006 1            EXTEND
0211  REF  2 LAST 568    24,2367  6 2360 0            BZMF    NOQJETS

0212  REF  4 LAST 568    24,2370  11'425 1            CCS     RRATEDIF
0213  REF  1             24,2371  1 2402 1            TCF     R+Q-CHKR
0214  REF  1             24,2372  1 2374 1            TCF     Q-NORJTS
0215  REF  1             24,2373  1 2407 1            TCF     R-Q-CHKR

0216  REF  4 LAST 567    24,2374  4 1424 0  Q-NORJTS  CS      QRATEDIF
0217  REF  1             24,2375  55'443 1            TS      RATEDIF
0218  REF  4 LAST 549    24,2376  6 1507 1            AD      -2JETLIM
0219                     24,2377  0 0006 1            EXTEND
0220  REF  2 LAST 565    24,2400  6 3453 0            BZMF    2JETS+Q
0221  REF  1             24,2401  1 3447 1            TCF     4JETS+Q

0222  REF  5 LAST 568    24,2402  6 1506 0  R+Q-CHKR  AD      -RATEDB
0223                     24,2403  0 0006 1            EXTEND
0224  REF  2 LAST 568    24,2404  6 2374 0            BZMF    Q-NORJTS
0225  REF  1             24,2405  0 3656 1            TC      EDOTVGEN
0226  REF  1             24,2406  1 3360 0            TCF     2-V.RATE

0227  REF  6 LAST 568    24,2407  6 1506 0  R-Q-CHKR  AD      -RATEDB
0228                     24,2410  0 0006 1            EXTEND
0229  REF  3 LAST 568    24,2411  6 2374 0            BZMF    Q-NORJTS
0230  REF  1             24,2412  0 3652 0            TC      EDOTUGEN
0231                     24,2413  0 0006 1            EXTEND
0232  REF  5 LAST 568    24,2414  61'425 0            SU      RRATEDIF
0233  REF  1             24,2415  1 3405 1            TCF     2+U.RATE

0234  REF  7 LAST 568    24,2416  6 1506 0  POSQEROR  AD      -RATEDB
0235                     24,2417  0 0006 1            EXTEND
0236  REF  3 LAST 568    24,2420  6 2360 0            BZMF    NOQJETS

0237  REF  6 LAST 568    24,2421  11'425 1            CCS     RRATEDIF
0238  REF  1             24,2422  1 2433 0            TCF     R+Q+CHKR
0239  REF  1             24,2423  1 2425 1            TCF     Q+NORJTS
0240  REF  1             24,2424  1 2440 1            TCF     R-Q+CHKR

0241  REF  5 LAST 568    24,2425  3 1424 1  Q+NORJTS  CA      QRATEDIF
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0242   REF    2 LAST 568     24,2426  55'443 1             TS       RATEDIF
0243   REF    5 LAST 568     24,2427  6 1507 1             AD       -2JETLIM
0244                         24,2430  0 0006 1             EXTEND
0245   REF    2 LAST 565     24,2431  6 3271 0             BZMF     2JETS-Q
0246   REF    1              24,2432  1 3265 1             TCF      4JETS-Q

0247   REF    8 LAST 568     24,2433  6 1506 0  R+Q+CHKR   AD       -RATEDB
0248                         24,2434  0 0006 1             EXTEND
0249   REF    2 LAST 568     24,2435  6 2425 0             BZMF     Q+NORJTS
0250   REF    2 LAST 568     24,2436  0 3652 0             TC       EDOTUGEN
0251   REF    1              24,2437  1 3245 0             TCF      2-U.RATE

0252   REF    9 LAST 569     24,2440  6 1506 0  R-Q+CHKR   AD       -RATEDB
0253                         24,2441  0 0006 1             EXTEND
0254   REF    3 LAST 569     24,2442  6 2425 0             BZMF     Q+NORJTS
0255   REF    2 LAST 568     24,2443  0 3656 1             TC       EDOTVGEN
0256   REF    1              24,2444  1 3312 0             TCF      2+V.RATE

0257   REF   10 LAST 569     24,2445  6 1506 0  R+,CHKDB   AD       -RATEDB
0258                         24,2446  0 0006 1             EXTEND
0259   REF    6 LAST 568     24,2447  6 2504 1             BZMF     XTRANS
0260   REF    7 LAST 568     24,2450  3 1425 0             CA       RRATEDIF
0261   REF    3 LAST 569     24,2451  55'443 1             TS       RATEDIF
0262   REF    6 LAST 569     24,2452  6 1507 1             AD       -2JETLIM
0263                         24,2453  0 0006 1             EXTEND
0264   REF    2 LAST 566     24,2454  6 3224 0             BZMF     2JETS-R
0265   REF    1              24,2455  1 3220 0             TCF      4JETS-R

0266   REF   11 LAST 569     24,2456  6 1506 0  R-,CHKDB   AD       -RATEDB
0267                         24,2457  0 0006 1             EXTEND
0268   REF    7 LAST 569     24,2460  6 2504 1             BZMF     XTRANS
0269   REF    8 LAST 569     24,2461  4 1425 1             CS       RRATEDIF
0270   REF    4 LAST 569     24,2462  55'443 1             TS       RATEDIF
0271   REF    7 LAST 569     24,2463  6 1507 1             AD       -2JETLIM
0272                         24,2464  0 0006 1             EXTEND
0273   REF    2 LAST 565     24,2465  6 3433 0             BZMF     2JETS+R
0274   REF    1              24,2466  1 3427 1             TCF      4JETS+R

0275   REF    5 LAST 569     24,2467  11'443 1  RTJETIME   CCS      RATEDIF        SCALED AT PI/4 RADIANS/SECOND
0276   REF  150 LAST 564     24,2470  6 7657 1             AD       ONE
0277                         24,2471  1 2473 1             TCF       +2
0278   REF  151 LAST 569     24,2472  6 7657 1             AD       ONE            ABS(RATEDIF)
0279                         24,2473  0 0006 1             EXTEND
0280   REF    3 LAST 552     24,2474  7 1471 0             MP       1/NJETAC       SCALED AT 2(8)/PI SECOND(2)/RADIANS
0281                         24,2475  0 0006 1             EXTEND
0282   REF   37 LAST 564     24,2476  7 7654 0             MP       BIT4           SCALED AT 2(3) SECONDS
0283   REF  195 LAST 567     24,2477  30 001 0             CAE      L
0284                         24,2500  0 0006 1             EXTEND
0285   REF    1              24,2501  7 2703 0             MP       25/32.QR       TJET NOW PROPERLY SCALED IN A
0286   REF    7 LAST 566     24,2502  55'626 0             TS       TQR            AT 2(4)16/25 SECONDS
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 0287   REF   2 LAST 566     24,2503  1 2554 0            TCF     TORQUEV


R0288   TRANSLATION WITHOUT ROTATION IS ACCOMPLISHED IN XTRANS SECTION

 0289   REF 215 LAST 567     24,2504  3 7665 0  XTRANS    CA      ZERO
 0290   REF   6 LAST 554     24,2505  55'504 0            TS      ADDTLT6
 0291   REF   5 LAST 554     24,2506  55'503 1            TS      ADDT6JTS
 0292   REF  40 LAST 565     24,2507  3 7652 1            CA      BIT6
 0293   REF  35 LAST 567     24,2510  7 0765 1            MASK    DAPBOOLS          CHECKING THE ULLAGE BIT

 0294                        24,2511  0 0006 1            EXTEND
 0295  *                     24,2512  1 2516 0            BZF     +4
 0296   REF   1              24,2513  3 2723 0            CA      ALL+XJTS          ULLAGE JETS
 0297   REF   2 LAST  33     24,2514  0 4225 0  WRITEON   TC      WRITEQR
 0298   REF  31 LAST 565     24,2515  1 4606 1            TCF     RESUME
 0301  *REF  32 LAST 562     24,2516  3 7651 1   +4       CAF     BIT7
 0302                        24,2517  0 0006 1            EXTEND
 0303                        24,2520  02 031 1            RAND    31
 0304                        24,2521  0 0006 1            EXTEND
 0305   REF   1              24,2522  1 2532 0            BZF     +XTRANS

 0306   REF  24 LAST 479     24,2523  3 7650 0            CA      BIT8              -X TRANS BIT.INVERTED
 0307                        24,2524  0 0006 1            EXTEND
 0308                        24,2525  02 031 1            RAND    31
 0309                        24,2526  0 0006 1            EXTEND
 0310   REF   1              24,2527  1 2543 0            BZF     -XTRANS
 0311   REF 216 LAST 570     24,2530  3 7665 0  NOTORQUE  CA      ZERO
 0312   REF   1              24,2531  1 2514 1            TCF     WRITEON
 0315   REF   1              24,2532  3 2724 1  +XTRANS   CAF     2,10-OUT          CHECK FOR FAILURE OF 2 OR 10
 0316                        24,2533  0 0006 1            EXTEND
 0317                        24,2534  06 032 0            RXOR    32
 0318                        24,2535  0 0006 1            EXTEND
 0319                        24,2536  1 2541 1            BZF      +3               2 AND 10 GOOD
 0320   REF   1              24,2537  3 2726 0            CA      +X,B              SINCE 2 OR 10 FAILED, USE 6 AND 14 OF B
 0321   REF   2 LAST 570     24,2540  1 2514 1            TCF     WRITEON
 0322   REF   1              24,2541  3 2725 0   +3       CA      +X,A              2 AND 10 SYSTEM A
 0323   REF   3 LAST 570     24,2542  1 2514 1            TCF     WRITEON
 0324   REF   1              24,2543  3 2727 1  -XTRANS   CAF     1,9-OUT           CHECK FOR FAILURE OF 1 OR 9
 0325                        24,2544  0 0006 1            EXTEND
 0326                        24,2545  06 032 0            RXOR    32
 0327                        24,2546  0 0006 1            EXTEND
 0328                        24,2547  1 2552 0            BZF      +3               1 AND 9 GOOD
 0329   REF   1              24,2550  3 2730 1            CA      -X,A              SINCE 1 OR 9 FAILED, USE 5 AND 13 OF A
 0330   REF   4 LAST 570     24,2551  1 2514 1            TCF     WRITEON
 0331   REF   1              24,2552  3 2731 0   +3       CA      -X,B              1 AND 9 SYSTEM B
 0332   REF   5 LAST 570     24,2553  1 2514 1            TCF     WRITEON
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L      @Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                                          USER'S OWN PAGE NO.  10

P0333  DO NECESSARY PARTS OF Q,R-AXES TORQUE VECTOR RECONSTRUCTION HERE AND NOW.  FOR OTHER PARTS WAIT UNTIL THE NEXT
R0335  P-AXIS RCS DAP T5RUPT.

 0336   REF   8 LAST 569    24,2554  4 1626 0  TORQUEV  CS      TQR           CALCULATED Q,R JET TIME (AS IN TIME6)
 0337   REF   2 LAST 566    24,2555  6 2702 0           AD      +T6TJMIN
 0338                       24,2556  0 0006 1           EXTEND                  CORRECT BRANCH.
 0339   REF   1             24,2557  6 2567 1           BZMF    TQRGTTMI      BRANCH FOR TQR = OR GREATER THAN MINIMP.
 0340   REF 217 LAST 570    24,2560  3 7665 0           CA      ZERO
 0341   REF  19 LAST 555    24,2561  55'505 1           TS      TOFJTCHG      SINCE TQR LESS THAN A MINIMUM IMPULSE,
 0342   REF   8 LAST 564    24,2562  55'616 0           TS      JETRATEQ        ZERO ALL OF THESE REGISTERS AND GO TO
 0343   REF   8 LAST 564    24,2563  55'617 1           TS      JETRATER        JET LIST.
 0344   REF  13 LAST 555    24,2564  3 1502 1           CA      JTSATCHG
 0345   REF   3 LAST 570    24,2565  0 4225 0           TC      WRITEQR
 0346   REF  32 LAST 570    24,2566  1 4606 1           TCF     RESUME
 034602 REF   9 LAST 571    24,2567  3 1626 1  TQRGTTMI CA      TQR
 034603 REF  20 LAST 571    24,2570  55'505 1           TS      TOFJTCHG
 034604 REF   1             24,2571  6 2701 0           AD      -1.5CSP
 034606                     24,2572  0 0006 1           EXTEND
 034608 REF   1             24,2573  6 2630 0           BZMF    DOQRSKIP
 03461  REF   2 LAST 564    24,2574  3 1630 0           CA      1JACCQ
 034612                     24,2575  0 0006 1           EXTEND
 034614 REF   5 LAST 564    24,2576  7 1620 0           MP      NO.QJETS
 034615 REF 196 LAST 569    24,2577  3 0001 0           CA      L
 034616 REF  77 LAST 566    24,2600  54 065 0           TS      ITEMP1
 034618                     24,2601  0 0006 1           EXTEND                ?
 03462  REF   2 LAST 558    24,2602  7 1623 0           MP      QR.1STOQ
 034622 REF   9 LAST 571    24,2603  55'616 0           TS      JETRATEQ
 034624 REF  78 LAST 571    24,2604  3 0065 1           CA      ITEMP1
 034626                     24,2605  0 0006 1           EXTEND
 034628 REF   1             24,2606  7 2627 1           MP      0.1AT1
 03463  REF   4 LAST 564    24,2607  27'640 0           ADS     SUMRATEQ
 0347   REF   2 LAST 564    24,2610  3 1631 1           CA      1JACCR
 0348                       24,2611  0 0006 1           EXTEND
 0349   REF   4 LAST 564    24,2612  7 1621 1           MP      NO.RJETS
 0350   REF 197 LAST 571    24,2613  3 0001 0           CA      L
 0351   REF  79 LAST 571    24,2614  54 065 0           TS      ITEMP1
 0352                       24,2615  0 0006 1           EXTEND                ?
 0353   REF   3 LAST 571    24,2616  7 1623 0           MP      QR.1STOQ
 0354   REF   9 LAST 571    24,2617  55'617 1           TS      JETRATER
 0355   REF  80 LAST 571    24,2620  3 0065 1           CA      ITEMP1
 0356                       24,2621  0 0006 1           EXTEND
 0357   REF   2 LAST 571    24,2622  7 2627 1           MP      0.1AT1
 0358   REF   3 LAST 564    24,2623  27'641 1           ADS     SUMRATER
 03581  REF   1             24,2624  3 1501 1           CA      JTSONNOW
 0359   REF   6 LAST 570    24,2625  1 2514 1           TCF     WRITEON
 0360   REF   1             24,2626   02073 1  SKIPQRAD GENADR  SKIPQRAX
 036002                     24,2627   03146 1  0.1AT1   DEC     +0.10000
 036004 REF   1             24,2630  3 2626 1  DOQRSKIP CA      SKIPQRAD
 036008 REF   3 LAST 563    24,2631  55'614 1           TS      QJUMPADR
R0361  CHANGE JET ON AND OFF BITS TO ACCOUNT FOR THE PRESENT STATE OF THE
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R0362       CHANNEL. THE CHANGES ACCOUNT FOR PURE ROTATION ONLY- NOT TRANSLATION.
 0363   REF   2 LAST 571     24,2632  3 1501 1           CA       JTSONNOW        = JETS WHICH ARE TO GO ON NOW.
 0364                        24,2633  0 0006 1           EXTEND
 0365                        24,2634  02 005 0           RAND     5               MASK THE CHANNEL WITH THE DESIRED STATE.
 0366                        24,2635  0 0006 1           EXTEND
 0367   REF   1              24,2636  1 2663 1           BZF      NOQRON          A IS ZERO IF NO JETS TO GO ON ARE ON.
 0368   REF  35 LAST 566     24,2637  6 7641 0           AD       BIT15           MAKE DIFFERENCE CORRESPOND TO A QR JET.
 0369                        24,2640  0 0006 1           EXTEND
 0370   REF   3 LAST 572     24,2641  61'501 1           SU       JTSONNOW        RESULT IS COMPLEMENT OF JET BITS WHICH
 0371   REF 198 LAST 571     24,2642  54 001 1           TS       L                 ARE TO BE ON FOR 6.5MS MORE THAN CALC.
 0372                        24,2643  0 0006 1           EXTEND
 0373   REF   1              24,2644  1 2670 0           BZF      JTSAREON        A=0,THUS ALL JETS TO GO ON ARE NOW ON.
 0374   REF  14 LAST 571     24,2645  31'502 1  TRSLTMN2 CAE      JTSATCHG
 0375   REF  34 LAST 552     24,2646  7 7637 0           MASK     POSMAX          REMOVE BIT15 FROM JTSATCHG.
 0376                        24,2647  0 0006 1           EXTEND
 0377   REF   1              24,2650  1 2654 0           BZF      NOTRANS         IF JTSATCHG = 0 THEN NO TRANSLATION NOW.
 0382   REF   1              24,2651  3 2712 1           CA       14-TQRMN
 0383   REF  21 LAST 571     24,2652  27'505 1           ADS      TOFJTCHG        INSURE T GREATER THAN 14 MS.
 0384   REF   1              24,2653  1 2674 1           TCF      TOJTLST
 0388   REF 199 LAST 572     24,2654  4 0001 1  NOTRANS  CS       L
 0389   REF  36 LAST 572     24,2655  6 7641 0           AD       BIT15           MAKE JET BITS CORRESPOND TO QR AXIS.
 0390   REF  15 LAST 572     24,2656  57'502 1           XCH      JTSATCHG        JTSONNOW - L = JETS ON AT TOFJTCHG.
 0391   REF   6 LAST 570     24,2657  55'503 1           TS       ADDT6JTS        JTS ON AT TOFJTCHG +ONDELAY.
 0392   REF   2 LAST 572     24,2660  3 2712 1           CA       14-TQRMN
 0393   REF   7 LAST 570     24,2661  55'504 0           TS       ADDTLT6
 0394   REF   2 LAST 572     24,2662  1 2674 1           TCF      TOJTLST
 0395   REF   3 LAST 572     24,2663  3 2712 1  NOQRON   CA       14-TQRMN
 0396   REF  22 LAST 572     24,2664  27'505 1           ADS      TOFJTCHG
 0397   REF 218 LAST 571     24,2665  3 7665 0           CA       ZERO
 0398   REF   8 LAST 572     24,2666  55'504 0           TS       ADDTLT6
 0399   REF   3 LAST 572     24,2667  1 2674 1           TCF      TOJTLST
 0408   REF   1              24,2670  3 2711 1  JTSAREON CA       MCOMPTQR
 0409   REF  23 LAST 572     24,2671  27'505 1           ADS      TOFJTCHG
 0410   REF 219 LAST 572     24,2672  3 7665 0           CA       ZERO
 0411   REF   9 LAST 572     24,2673  55'504 0           TS       ADDTLT6
 0412   REF   4 LAST 572     24,2674  3 1501 1  TOJTLST  CA       JTSONNOW
 04121  REF   4 LAST 571     24,2675  0 4225 0           TC       WRITEQR
 04122                       24,2676  0 0006 1           EXTEND
 04123  REF   1              24,2677  3 2733 1           DCA      JTLSTADR
 04124                       24,2700  52 006 0           DTCB
 04126 *                     24,2701   77417 0  -1.5CSP  DEC      -0.01465
 0413                        24,2702   00014 1  +T6TJMIN DEC      +.00073
 0414                        24,2703   31000 0  25/32.QR DEC      0.78125
 0415                        24,2704   37776 0  MS20QR   OCTAL    37776
 0416                        24,2705   37775 0  MS30QR   OCTAL    37775
 0417                        24,2706   37773 0  MS50QR   OCTAL    37773
 0418                        24,2707   00010 0  16/32400 DEC      0.00049
 0419                        24,2710   00600 1  BIT8,9   OCTAL    00600
 0420                        24,2711   77765 0  MCOMPTQR OCTAL    77765           -10 MS COMPUTATION TIME
 0421                        24,2712   00013 0  14-TQRMN DEC      11
 0422   REF    1              24,2713    02243 0  MINTADR   GENADR MINTJET
 0423                         24,2714    43415 0  -.88975   DEC    -.88975
 0424                         24,2715    20000 0  (1-K),QR  DEC    0.50000           K = 1/2
 0425                         24,2716    02000 0  (1-KQ)/8  DEC    0.06250
 0426                         24,2717    77557 0  -90MS     DEC    -.00879
 0427                         24,2720    00220 1  +90MS     DEC    0.00879
 0428                         24,2721    77537 0  NEGCSP2   DEC    -.00977
 0429                         24,2722    24366 1  16/25QR   DEC    0.64000
 0430                         24,2723    40252 0  ALL+XJTS  OCTAL  40252
 0431                         24,2724    00201 1  2,10-OUT  OCTAL  00201
 0432                         24,2725    40042 0  +X,A      OCTAL  40042
 0433                         24,2726    40210 0  +X,B      OCTAL  40210
 0434                         24,2727    00104 1  1,9-OUT   OCTAL  00104
 0435                         24,2730    40104 0  -X,A      OCTAL  40104
 0436                         24,2731    40021 0  -X,B      OCTAL  40021
 0437                         24,2732    02716 0  JTLSTADR  2CADR  JTLST
C0437   REF    2 LAST 553     24,2733    46006 0
 0438   REF    1              24,2734    02467 0  RTJETADR GENADR RTJETIME
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P0439   Q,R-AXES ATTITUDE STEERING CALCULATIONS:

R0440   (EXECUTED WHEN LGC IS IN AUTOMATIC SCSMODE OR IF SCSMODE IS ATTITUDE HOLD AND THE ROTATIONAL HAND CONTROLLER IS
R0442   NEITHER OUT OF DETENT NOR IS THE RATE COMMAND BIT SET IN DAPBOOLS)

R0443   IMMEDIATELY AFTER CALCULATING THE ATTITUDE ERRORS, THE FOLLOWING TESTS ARE MADE TO DETERMINE WHETHER THE DESCENT
R0445   ENGINE TRIM GIMBAL SHOULD BE USED TO CONTROL THE LEM ATTITUDE RATHER THAN THE RCS JETS:

R0447             1) IS THE TRIM GIMBAL FUNCTIONALLY OPERATIVE?
R0448             2) ARE THE Q,R-AXES RCS JETS OFF?
R0449             3) ARE BOTH TRIM GIMBAL DRIVES OFF?
R0450             4) IS THE LEM RATE LESS THAN .5 DEG/SEC ABOUT BOTH AXES?

 0451   REF   1               24,2735   3 2742 1  GOTOGTS   CAF     INITFILT          ERRORS NOW CONTROLLABLE BY TRIM GIMBAL
 0452   REF   9 LAST 565      24,2736  54 345  1            TS      T5ADR             SET T5RUPT TO GO TO FILTER INITIALIZING
 0453   REF  33 LAST 571      24,2737   1 4606 1            TCF     RESUME            PROGRAM

 0454                         24,2740   07400 1  BGIM24    OCTAL   07400
 0455   REF   1               24,2741   03644 1  DESCADR   GENADR  TJET-LAW          RETURN ADDRESS FOR JET SELECT LOGIC
 0456   REF   1               24,2742   02000 0  INITFILT  GENADR  FILTINIT          ADDRESS OF FILTER INITIALIZATION RUPT

R0457   "ATTSTEER" IS THE NOMINAL ENTRY POINT FOR REACTION CONTROL SYSTEM ATTITUDE STEERING:
R0459   BEGIN ATTSTEER BY CHECKING IF RATE HOLD MODE(CURRENTLY USED ONLY AT SIVB
R0460   -LEM SEPARATION-206 MISSION PHASE 6) IS REQUESTED(BIT 14 OF DAPBOOLS ON)
R0461   IF BIT 14 IS OFF, BRANCH TO QERRCALC DIRECTLY AND BEGIN AUTOMATIC
R0462   STEERING.  IF BIT 14 IS ON, TEST BIT 3 OF DAPBOOLS TO SEE IF THE DESIRED
R0463   RATE HAS BEEN SAVED YET.  IF IT IS ON, THIS IS NOT THE FIRST PASS AND
R0464   THE RATE HAS BEEN SAVED.  GO DIRECTLY TO QERRCALC FOR AUTOMATIC STEERING
R0465   IF THE BIT IS OFF, THE RATE MUST BE SAVED.  TRANSFER TO SAVERATE(BANK25)
R0466   AND RETURN AFTER FIRST PASS TO RESUME AND DAPIDLER.

R0467   IN ORDER TO USE RATE HOLD, THE MISSION PROGRAMMER MUST SET BIT 14 OF
R0468   DAPBOOLS ON AND SET BIT 3 OF DAPBOOLS TO ZERO.  UPON RETURNING FROM THE
R0469   FIRST PASS AT LEAST THROUGH RATE HOLD, THE MISSION PROGRAMMER MUST RESET
R0470   BIT 3 TO ITS PREVIOUS VALUE IF THIS IS NOT 1, BECAUSE SAVERATE SETS BIT3
R0471   TO 1 FOR ALL PASSES AFTER THE FIRST IN ORDER NOT TO SAVE THE RATE AGAIN.

R0472   IN ADDITION TO NON-RATE HOLD MODE AND NON-FIRST PASS RATE HOLD MODE
R0473   EXITS TO QERRCALC, THE FIRST PASS EXITS TO RESUME, IE. OUT OF INTERRUPT
R0474   AND BACK TO DAPIDLER TO AWAIT THE NEXT CALL TO DAP.

R0475   RATE HOLD PRODUCES THE FOLLOWING OUTPUT IN ERASABLE --

R0476      CDUD - SCALED AT +/-PI, DESIRED GIMBAL ANGLE

R0477      DELCDU - SCALED AT +/-PI, INCREMENT TO CDUD EVERY 100 MS.

R0478      OMEGAPD, QD, RD - SCALED AT +/-PI/4, BODY AXIS RATES

R0479   ALL THESE ARE USED BY AUTOMATIC STEERING MODE EQUATIONS.
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R0480   RATE HOLD REQUIRES OMEGAP, Q, R EVERY .25 SEC, AND ALSO REQUIRES PILOT-
R0481   TO-GIMBAL AXIS MATRIX ELEMENTS, MR12, 22, 13, 23 TO BE LOCATED IN THAT
R0482   ORDER.

R0483   FINALLY, RATE HOLD LEAVES DEBRIS IN --

R0484      DLCDUIDX - LOOP INDEX USED IN COMPUTING DELCDUS, = 1, 0

R0485      ITEMP1 - STORES TEMPORARY PRODUCTS AND SUMS, LEFT WITH DELCDUY IN 1S.


 0486   REF  36 LAST 570     24,2743  4 0765 1  ATTSTEER CS      DAPBOOLS          DOES BIT14 OF DAPBOOLS REQUEST RATE HOLD
 0487   REF  39 LAST 565     24,2744  7 7642 1           MASK    BIT14             (SIVB-LEM SEPARATION)
 0488   REF 349 LAST 563     24,2745  10 000 0           CCS     A
 0489   REF   1              24,2746  1 3025 1           TCF     QERRCALC          NO, GO DIRECTLY TO AUTOMATIC STEERING

R0490   CHECK DAPBOOLS, BIT3, TO SEE IF DESIRED RATE HAS BEEN SAVED YET

 0491   REF  37 LAST 575     24,2747  30 765 0           CAE     DAPBOOLS          DOES BIT3 SHOW THAT THE DESIRED RATE HAS
 0492   REF  19 LAST 550     24,2750  7 7655 1           MASK    BIT3              BEEN SAVED(NOT FIRST PASS).  IF NOT, GO
 0493   REF 350 LAST 575     24,2751  10 000 0           CCS     A                 SAVE DESIRED RATES IN THE OMEGADS
 0494   REF   1              24,2752  1 2771 0           TCF     NEXDLCDU -1       YES, COMPUTE THE DELCDUS.

R0495   SAVERATE IS ENTERED ONLY DURING THE FIRST PASS THROUGH RATE HOLD.  IT
R0496   SAVES THE CURRENT CDUS FIRST IN CDUDS AND THEN SAVES THE BODY RATES,
R0497   OMEGAP, Q, R IN OMEGAPD, QD, RD.  NEXT, WE SET BIT 3 OF DAPBOOLS TO 1.

 0498                        24,2753  0 0006 1  SAVERATE EXTEND                    COME HERE FIRST TIME INTO RATE HOLD IN
 0499   REF  15 LAST 567     24,2754  3 0034 0           DCA     CDUY
 0500   REF   5 LAST 567     24,2755  52 776 0           DXCH    CDUYD             ORDER TO SET UP RATES, CDUS, AND DELCDUS
 0501   REF  31 LAST 567     24,2756  30 032 0           CAE     CDUX
 0502   REF   8 LAST 567     24,2757  54 774 1           TS      CDUXD             FIRST, CDUDS = CDUS AT SIVB SEPARATION

 0503                        24,2760  0 0006 1           EXTEND                    NEXT, SAVE CURRENT SIVB SEPARATION RATES
 0504   REF  13 LAST 566     24,2761  3 1417 1           DCA     OMEGAP
 0505   REF   5 LAST 558     24,2762  53'427 0           DXCH    OMEGAPD           OMEGAP AND OMEGAR, IN OMEGAPD AND
 0506   REF   9 LAST 567     24,2763  31'421 1           CAE     OMEGAR
 0507   REF   2 LAST 558     24,2764  55'430 0           TS      OMEGARD           OMEGARD.  LEM HELD TO RATES FOR 13 SECS.

 0508   REF  20 LAST 575     24,2765  3 7655 0           CAF     BIT3              RESET BIT 3 = 1 SO THAT RATES NOT SAVED
 0509   REF  38 LAST 575     24,2766  26 765 1           ADS     DAPBOOLS          AGAIN IN RATE HOLD PASSES
 0510   REF  34 LAST 574     24,2767  1 4606 1           TCF     RESUME            RETURN TO IDLE AFTER SAVING RATE

 0511                        24,2770   00632 0  100MSCAL DEC     .025              100 MS. SCALED AT 4 SEC.  RATE HOLD DELT

R0512   TO COMPUTE THE DELCDUS, Y AND Z, WE SET UP A LOOP AND SOLVE THE EQUATION

R0513    C(DELCDUY+DLCDUIDX)=(OMEGAQD.C(MR12+DLCDUIDX)+OMEGARD.C(MR13+DLCDUIDX))
R0514                       .(100MS) SCALED AT PI IN 2S COMPLEMENT(LIKE CDUS)
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R0515   DURING THIS COMPUTATION, ITEMP1 IS USED TO STORE THE PARTIAL SUMS AND
R0516   PRODUCTS.  DELCDUY IS RESCALED TO 1 AS MR12 AND MR13 ARE SCALED AT 2.
R0517   AFTER CONVERTING TO TWOS COMPLEMENT, WE SET DELCDUX TO ZERO TO AVOID ANY
R0518   ROLL DURING RATE HOLD MODE.  NOTE THAT DELCDUS ARE COMPUTED IN THE NEGA-
R0519   TIVE TO ALLOW 2S COMP. MOD. SUBTRACT LATER ON (CDU-(-DELCDU))

 0520   REF 152 LAST 569    24,2771  3 7657 1           CAF    ONE            SET UP LOOP INDEX TO COMPUTE DELCDUS.
 0521   REF   1             24,2772  55'672 1  NEXDLCDU TS     DLCDUIDX       DLCDUIDX = C(A)

 0522   REF   2 LAST 558    24,2773  4 1427 0           CS     OMEGAQD        DLCDUIDX = 1             DLCDUIDX = 0
 0523                       24,2774  0 0006 1           EXTEND                ITEMP1=-OMEGAQD.MR22
 0524   REF   2 LAST 576    24,2775  5 1672 0           INDEX  DLCDUIDX
 0525   REF   3 LAST 182    24,2776  7 1400 0           MP     MR12           MR22 SCALED AT 1      MR12 SCALED AT 2
 0526   REF  81 LAST 571    24,2777  54 065 0           TS     ITEMP1                            ITEMP1=-OMEGAQD.MR12

 0527   REF   3 LAST 575    24,3000  4 1430 0           CS     OMEGARD        C(A)=ITEMP1 -OMEGARD.MR23
 0528                       24,3001  0 0006 1           EXTEND
 0529   REF   3 LAST 576    24,3002  5 1672 0           INDEX  DLCDUIDX                     C(A)=ITEMP1 -OMEGARD.MR13
 0530   REF   2 LAST 182    24,3003  7 1402 1           MP     MR13           MR23 SCALED AT 1       MR13 SCALED AT 2
 0531   REF  82 LAST 576    24,3004  6 0065 1           AD     ITEMP1
 0532                       24,3005  0 0006 1           EXTEND                DELT = 100 MS. SCALED AT 4 SEC.
 0533   REF   1             24,3006  7 2770 1           MP     100MSCAL
 0534   REF  83 LAST 576    24,3007  54 065 0           TS     ITEMP1         ITEMP1 = C(A) . DELT

 0535   REF   4 LAST 576    24,3010  11'672 1           CCS    DLCDUIDX       CHECK INDEX FOR RESCALING
 0536                       24,3011  1 3014 0           TCF    +3             DELCDUZ SCALED AT PI/4, RESCALE UNNEEDED
 0537   REF  84 LAST 576    24,3012  30 065 1           CAE    ITEMP1         DELCDUY SCALED AT PI/2, RESCALE BY
 0538   REF  85 LAST 576    24,3013  26 065 0           ADS    ITEMP1         ADDING TO ITSELF

 0539   REF  86 LAST 576    24,3014  10 065 0           CCS    ITEMP1         CONVERT DELCDUS TO TWOS COMPLEMENT (SAME
 0540   REF 153 LAST 576    24,3015  6 7657 1           AD     ONE            AS CDUS).  ADD ONE TO RESTORE PRE-CCS A
 0541   REF   1             24,3016  1 3020 1           TCF    STODLCDU       STORE DIRECT IF POSITIVE ZERO
 0542                       24,3017  4 0000 0           COM                   COMPLEMENT IF NEGATIVE, CCS INCREMENTS
 0543   REF   5 LAST 576    24,3020  51'672 0  STODLCDU INDEX  DLCDUIDX       IF NEGATIVE ZERO, STORE POSITIVE ZERO
 0544   REF   1             24,3021  55'674 1           TS     DELCDUY        STORE FINAL DELCDUZ OR DELCDUY

 0545   REF   6 LAST 576    24,3022  11'672 1           CCS    DLCDUIDX       TEST INDEX DLCDUIDX, EITHER 1 OR 0
 0546   REF   2 LAST 575    24,3023  1 2772 0           TCF    NEXDLCDU       IF 1, DO DELCDUY
 0547   REF   2 LAST 544    24,3024  55'673 0           TS     DELCDUX        DELCDUZ,Y DONE, 0 TO DELCDUX-NO ROLL

 0548   REF  16 LAST 575    24,3025  30 033 1  QERRCALC CAE    CDUY           Q-ERROR CALCULATION
 0549                       24,3026  0 0006 1           EXTEND
 0550   REF   6 LAST 575    24,3027  20 775 0           MSU    CDUYD          CDU ANGLE - ANGLE DESIRED (Y-AXIS)
 0551   REF  87 LAST 576    24,3030  54 065 0           TS     ITEMP1         SAVE FOR RERRCALC
 0552                       24,3031  0 0006 1           EXTEND
 0553   REF   3 LAST 563    24,3032  7 1405 0           MP     M21            (CDUY-CDUYD)*M21 SCALED AT PI RADIANS
 0554   REF   2 LAST 535    24,3033  57'413 0           XCH    ER             SAVE FIRST TERM (OF TWO) IN OPP.AXIS REG
 0555   REF  18 LAST 567    24,3034  30 034 0           CAE    CDUZ           SECOND TERM CALCULATION:
 0556                       24,3035  0 0006 1           EXTEND
 0557   REF   5 LAST 567    24,3036  20 776 0           MSU    CDUZD          CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0558   REF  28 LAST 563   24,3037  54 066 0           TS      ITEMP2        SAVE FOR RERRCALC
 0559                      24,3040  0 0006 1           EXTEND
 0560   REF   6 LAST 563   24,3041  7 1401 1           MP      M22           (CDUZ-CDUZD)*M22 SCALED AT PI RADIANS
 0561   REF   3 LAST 576   24,3042  27'413 1           ADS     ER            SAVE SUM OF TERMS, NO OVERFLOW EVER
 0562   REF   3 LAST 557   24,3043  55'477 0           TS      QERROR        SAVE QERROR FOR EIGHT-BALL DISPLAY

 0563   REF  88 LAST 576   24,3044  30 065 1  RERRCALC CAE     ITEMP1        R-ERROR CALCULATION:
 0564                      24,3045  0 0006 1           EXTEND                CDU ANGLE -ANGLE DESIRED (Y-AXIS)
 0565   REF   3 LAST 563   24,3046  7 1406 0           MP      M31           (CDUY-CDUYD)*M31 SCALED AT PI RADIANS
 0566   REF   5 LAST 552   24,3047  57'411 1           XCH     E             SAVE FIRST TERM (OF TWO) IN OPP.AXIS REG
 0567   REF  29 LAST 577   24,3050  30 066 1           CAE     ITEMP2        SECOND TERM CALCULATION:
 0568                      24,3051  0 0006 1           EXTEND                CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0569   REF   5 LAST 563   24,3052  7 1403 0           MP      M32           (CDUZ-CDUZD)*M32 SCALED AT PI RADIANS
 0570   REF   6 LAST 577   24,3053  27'411 0           ADS     E             SAVE SUM OF TERMS, NO OVERFLOW EVER
 0571   REF   3 LAST 558   24,3054  55'500 1           TS      RERROR        SAVE R-ERROR FOR EIGHT-BALL DISPLAY

R0572   TEST (1): IS THE TRIM GIMBAL FUNCTIONALLY OPERATIVE?

 0573   REF  29 LAST 565   24,3055  3 7656 0           CAF     BIT2          TEST TO SEE IF LEM AND DAP MODES ALLOW
 0574   REF  39 LAST 575   24,3056  7 0765 1           MASK    DAPBOOLS      USE OF TRIM GIMBAL CONTROL SYSTEM:
 0575   REF 351 LAST 575   24,3057  10 000 0           CCS     A             BIT2 = 0 MEANS THAT TRIM GIMBAL CONTROL
 0576   REF   1            24,3060  1 3122 1           TCF     STILLRCS      IS POSSIBLE, SO TEST OTHER TG CONDITIONS

R0577   TEST (2): ARE THE Q,R-AXES RCS JETS OFF?
 0578                      24,3061  0 0006 1           EXTEND                BUT, IF JETS ARE OFF AND TRIM GIMBAL MAY
 0579                      24,3062  00 005 1           READ    5             POSSIBLY BE USED: BEING IN THE JET COAST
 0580   REF 352 LAST 577   24,3063  10 000 0           CCS     A             REGION OF THE PHASE PLANE IS A NECESSARY
 0581   REF   2 LAST 577   24,3064  1 3122 1           TCF     STILLRCS      BUT INSUFFICIENT REASON FOR GTS USE

R0582   TEST(3): ARE BOTH TRIM GIMBAL DRIVES OFF?

 0583                      24,3065  0 0006 1           EXTEND                BITS 9-12 OF CHANNEL 12 ARE THE SIGNALS
 0584                      24,3066  00 012 1           READ    12            WHICH DRIVE THE TRIM GIMBAL ENGINE:
 0585   REF   1            24,3067  7 2740 1           MASK    BGIM24        IF NONE OF THESE BITS ARE ON, THEN BOTH
 0586   REF 353 LAST 577   24,3070  10 000 0           CCS     A             WAITLIST TASKS TO TURN OFF THE DRIVES
 0587   REF   3 LAST 577   24,3071  1 3122 1           TCF     STILLRCS      HAVE BEEN DONE AND GTS CONTROL CAN OCCUR

R0588   TEST (4): IS THE LEM RATE LESS THAN .5 DEG/SEC ABOUT BOTH AXES?

 0589   REF  49 LAST 567   24,3072  3 7657 1           CA      BIT1
 0590   REF   6 LAST 544   24,3073  54 073 1  LOOPTOP  TS      QRCNTR
 0591                      24,3074  6 0000 1           DOUBLE
 0592   REF 354 LAST 577   24,3075  50 000 1           INDEX   A
 0593   REF   9 LAST 567   24,3076  11'417 0           CCS     OMEGAQ        IS ERROR RATE SMALL ENOUGH FOR GTS.
 0594   REF   1            24,3077  6 3120 1           AD      -RATLM+1      -.5 DEG/SEC SCALED AT PI/4 + 1 BIT
 0595                      24,3100  1 3102 0           TCF      +2
 0596   REF   2 LAST 577   24,3101  6 3120 1           AD      -RATLM+1
 0597                      24,3102  0 0006 1           EXTEND
 0598                      24,3103  6 3105 0           BZMF     +2           IS RATE LESS,EQUAL .5 DEG/SEC.
 0599   REF   4 LAST 577   24,3104  1 3122 1           TCF     STILLRCS      NO.      SO USE RCS.
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L        @Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                                        USER'S OWN PAGE NO.  17

 0600    REF   7 LAST 577    24,3105  50 073 0            INDEX   QRCNTR          YES.     TRY THE ERROR MAGNITUDE.
 0601    REF   1             24,3106  11'477 0            CCS     QDIFF           IS ERROR SMALL ENOUGH FOR GTS.
 0602    REF   1             24,3107  6 3121 0            AD      -XBND+1         -1.4 DEG SCALED AT PI     + 1 BIT
 0603                        24,3110  1 3112 1            TCF      +2
 0604    REF   2 LAST 578    24,3111  6 3121 0            AD      -XBND+1
 0605                        24,3112  0 0006 1            EXTEND
 0606                        24,3113  6 3115 1            BZMF     +2             IS ERROR LESS,EQUAL 1.4 DEG.
 0607    REF   5 LAST 577    24,3114  1 3122 1            TCF     STILLRCS        NO.      USE RCS CONTROL.
 0608    REF   8 LAST 578    24,3115  10 073 1            CCS     QRCNTR          THIS AXIS IS FINE.   ARE BOTH DONE.
 0609    REF   1             24,3116  1 3073 1            TCF     LOOPTOP         NOW TRY THE Q AXIS.
 0610    REF   1             24,3117  1 2735 0            TCF     GOTOGTS         TRANSFER TO TRIM GIMBAL CONTROL
 0611                        24,3120   77512 1  -RATLM+1  OCT     77512           -.5 DEG/SEC SCALED AT PI/4  + 1 BIT
 0612                        24,3121   77601 0  -XBND+1   OCT     77601           -1.4 DEG SCALED AT PI, + 1 BIT.
R0613    "STILLRCS" IS THE ENTRY POINT TO RCS ATTITUDE STEERING WHENEVER IT IS FOUND THAT THE TRIM GIMBAL CONTROL
R0615    SYSTEM SHOULD NOT BE USED:

 0616    REF   1             24,3122  3 2741 1  STILLRCS  CAF     DESCADR         SET JET SELECT LOGIC RETURN ADDRESS TO
 0617    REF   3 LAST 567    24,3123  55'514 1            TS      TJETADR         THE Q,R-AXIS TJETLAW CALCULATION

 0618    REF   6 LAST 552    24,3124  0 4177 1            TC      T6JOBCHK        CHECK T6 CLOCK RUPT BEFORE SUBROUTINE

 0619    REF   1             24,3125  31'662 1  RURGENCY  CAE     1/NJTSR         SET-UP URGENCY SUBROUTINE
 0620    REF   4 LAST 569    24,3126  55'471 0            TS      1/NJETAC
 0621    REF   4 LAST 576    24,3127  4 1430 0            CS      OMEGARD         EDOTR = OMEGAR - OMEGARD
 0622    REF  10 LAST 575    24,3130  6 1421 1            AD      OMEGAR
 0623    REF   2 LAST 535    24,3131  55'425 1            TS      EDOTR           SCALED AT PI/4 RADIANS
 0624    REF   2 LAST 552    24,3132  0 3525 0            TC      URGROUTN        *** SUBROUTINE CALL ***
 0625    REF   1             24,3133  55'516 0            TS      URGENCYR        URGENCY LEFT IN A SCALED AT 2(4) SECS

 0626    REF   7 LAST 577    24,3134  53'412 0            DXCH    E               MOVE R-AXIS VARIABLES TO R-AXIS ERASABLE
 0627    REF   4 LAST 577    24,3135  53'414 0            DXCH    ER              FROM Q-XIS (COMMON) ERASABLE
 0628    REF   8 LAST 578    24,3136  55'411 0            TS      E
 0629    REF   2 LAST 535    24,3137  31'407 0            CAE     EDOT            (LOOK AT REORG FOR EFFIC: JDA 7/17/66)
 0630    REF   1             24,3140  55'410 1            TS      EDOT(R)

 0631    REF   4 LAST 541    24,3141  31'661 1  QURGENCY  CAE     1/NJTSQ         SET-UP URGENCY SUBROUTINE
 0632    REF   5 LAST 578    24,3142  55'471 0            TS      1/NJETAC
 0633    REF   3 LAST 576    24,3143  4 1427 0            CS      OMEGAQD         EDOTQ = OMEGAQ - OMEGAQD
 0634    REF  10 LAST 577    24,3144  6 1417 1            AD      OMEGAQ
 0635    REF   2 LAST 535    24,3145  55'424 0            TS      EDOTQ           SCALED AT PI/4 RADIANS
 0636    REF   3 LAST 578    24,3146  0 3525 0            TC      URGROUTN        *** SUBROUTINE CALL ***
 0637    REF   1             24,3147  55'515 0            TS      URGENCYQ        URGENCY LEFT IN A SCALED AT 2(4) SECS

 0638                        24,3150  0 0006 1            EXTEND
 0639    REF   1             24,3151  1 3321 0            BZF     BURGZERO        TEST FOR BOTH URGENCIES ZERO

 0640                        24,3152  0 0006 1            EXTEND
 0641    REF   1             24,3153  7 3336 0            MP      -TAN22.5
 0642    REF   2 LAST 578    24,3154  6 1516 1            AD      URGENCYR
 0643                        24,3155  0 0006 1            EXTEND
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CAE EDOTQ

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 0644   REF   1            24,3156  7 3334 1            MP      COS22.5         
 0645   REF   1            24,3157  55'521 1            TS      TERMA           UR.COS(22.5)-UQ.SIN(22.5)

 0646   REF   3 LAST 578   24,3160  4 1516 0            CS      URGENCYR
 0647                      24,3161  0 0006 1            EXTEND
 0648   REF   2 LAST 578   24,3162  7 3336 0            MP      -TAN22.5
 0649   REF   2 LAST 578   24,3163  6 1515 1            AD      URGENCYQ
 0650                      24,3164  0 0006 1            EXTEND
 0651   REF   2 LAST 579   24,3165  7 3334 1            MP      COS22.5
 0652   REF   1            24,3166  55'522 1            TS      TERMB           UR.SIN(22.5)+UQ.COS(22.5)

 0653   REF   2 LAST 579   24,3167  6 1521 0  A+B/A-B   AD      TERMA
 0654   REF   1            24,3170  55'517 1            TS      A+B
 0655   REF   2 LAST 579   24,3171  4 1522 1  A-B/ONLY  CS      TERMB
 0656   REF   3 LAST 579   24,3172  6 1521 0            AD      TERMA
 0657   REF   1            24,3173  55'520 0            TS      A-B

R0658   AXIS AND MODE SELECTION

 0659   REF   3 LAST 579   24,3174  31'522 0            CAE     TERMB           B URGENCY TEST
 0660                      24,3175  0 0006 1            EXTEND
 0661   REF   1            24,3176  6 3337 0            BZMF    NEGBURG

 0662   REF   4 LAST 579   24,3177  31'521 0  POSBURG   CAE     TERMA           A URGENCY TEST
 0663                      24,3200  0 0006 1            EXTEND
 0664   REF   1            24,3201  6 3254 1            BZMF    NEGAPOSB

 0665   REF   2 LAST 579   24,3202  31'520 1  POSAPOSB  CAE     A-B
 0666                      24,3203  0 0006 1            EXTEND
 0667   REF   1            24,3204  6 3232 1            BZMF    MINUSU          NEGATIVE U-AXIS SELECTED

 0668                      24,3205  0 0006 1  2/4JET-R  EXTEND
 0669   REF   5 LAST 578   24,3206  3 1414 1            DCA     ER
 0670   REF   9 LAST 578   24,3207  53'412 0            DXCH    E
 0671   REF   2 LAST 578   24,3210  31'410 0            CAE     EDOT(R)
 0672   REF   3 LAST 578   24,3211  55'407 1            TS      EDOT
 0673   REF   2 LAST 560   24,3212  31'652 1            CAE     .5ACCMNR
 0674   REF   6 LAST 560   24,3213  55'650 1            TS      .5ACCMNE
 0675   REF   1            24,3214  3 3524 1            CAF     URM             2/4 JET URGENCY TEST -R AXIS
 0676   REF   4 LAST 579   24,3215  6 1516 1            AD      URGENCYR
 0677                      24,3216  0 0006 1            EXTEND
 0678   REF   3 LAST 569   24,3217  6 3224 0            BZMF    2JETS-R

 0679   REF   1            24,3220  31'446 0  4JETS-R   CAE     1/2JTSR         MOVE 1/NJETAC UNMODIFIED
 0680   REF   6 LAST 578   24,3221  55'471 0            TS      1/NJETAC
 0681   REF  11 LAST 508   24,3222  4 7663 1            CS      SEVEN
 0682   REF   1            24,3223  1 3460 1            TCF     POLTYPE         GO FIND BEST POLICY

 0683   REF   1            24,3224  11'666 1  2JETS-R   CCS     RMANDACC        ASCENT 4-JET OVER-RIDE TEST
 0684   REF   2 LAST 569   24,3225  1 3220 0            TCF     4JETS-R
 0685   REF    2 LAST 579       24,3226  31'446 0             CAE     1/2JTSR
 0686   REF    7 LAST 579       24,3227  55'471 0             TS      1/NJETAC
 0687   REF   17 LAST 503       24,3230  4 6162 0             CS      SIX
 0688   REF    2 LAST 579       24,3231  1 3460 1             TCF     POLTYPE              GO FIND BEST POLICY

 0689   REF    2 LAST 560       24,3232  31'653 0   MINUSU    CAE     .5ACCMNU
 0690   REF    7 LAST 579       24,3233  55'650 1             TS      .5ACCMNE
 0691   REF    3 LAST 579       24,3234  31'515 1             CAE     URGENCYQ             2 JET OPT/MAND TEST: -U AXIS
 0692   REF    5 LAST 579       24,3235  6 1516 1             AD      URGENCYR
 0693   REF  355 LAST 577       24,3236  10 000 0             CCS     A
 0694   REF    1                24,3237  6 3524 1             AD      NEGURGUM
 0695                           24,3240  1 3242 1             TCF      +2
 0696   REF    2 LAST 580       24,3241  6 3524 1             AD      NEGURGUM
 0697                           24,3242  0 0006 1             EXTEND
 0698   REF    1                24,3243  6 3247 0             BZMF    2JETS-U

 0699   REF    1                24,3244  0 3474 0   2JETSM-U  TC      UXFORM
 0700   REF   13 LAST 555       24,3245  4 7664 0   2-U.RATE  CS      FIVE
 0701   REF    3 LAST 580       24,3246  1 3460 1             TCF     POLTYPE              GO FIND BEST POLICY

 0702   REF    1                24,3247  11'667 0   2JETS-U   CCS     UMANDACC             ASCENT 2-JET MANDATORY OVER-RIDE TEST
 0703   REF    1                24,3250  1 3244 1             TCF     2JETSM-U
 0704   REF    2 LAST 580       24,3251  0 3474 0             TC      UXFORM
 0705   REF   22 LAST 551       24,3252  4 7655 1             CS      FOUR
 0706   REF    4 LAST 580       24,3253  1 3460 1             TCF     POLTYPE              GO FIND BEST POLICY

 0707   REF    2 LAST 579       24,3254  31'517 0   NEGAPOSB  CAE     A+B
 0708                           24,3255  0 0006 1             EXTEND
 0709   REF    1                24,3256  6 3277 0             BZMF    PLUSV

 0710   REF    2 LAST 560       24,3257  31'651 1   2/4JET-Q  CAE     .5ACCMNQ
 0711   REF    8 LAST 580       24,3260  55'650 1             TS      .5ACCMNE
 0712   REF    1                24,3261  3 3524 1             CAF     UQM                  204 JET URGENCY TEST: -Q AXIS
 0713   REF    4 LAST 580       24,3262  6 1515 1             AD      URGENCYQ
 0714                           24,3263  0 0006 1             EXTEND
 0715   REF    3 LAST 569       24,3264  6 3273 1             BZMF    2JETS-Q +2           (FIRST TWO INSTRUCTIONS UNNECESSARY)

 0716   REF    1                24,3265  31'445 0   4JETS-Q   CAE     1/2JTSQ              MOVE 1/NJETAC UNMODIFIED
 0717   REF    8 LAST 580       24,3266  55'471 0             TS      1/NJETAC
 0718   REF   24 LAST 480       24,3267  4 6165 1             CS      THREE
 0719   REF    5 LAST 580       24,3270  1 3460 1             TCF     POLTYPE              GO FIND BEST POLICY

 0720   REF    4 LAST 541       24,3271  11'665 1   2JETS-Q   CCS     QMANDACC             ASCENT 4-JET OVER-RIDE TEST
 0721   REF    2 LAST 569       24,3272  1 3265 1             TCF     4JETS-Q
 0722   REF    2 LAST 580       24,3273  31'445 0             CAE     1/2JTSQ
 0723   REF    9 LAST 580       24,3274  55'471 0             TS      1/NJETAC
 0724   REF   80 LAST 553       24,3275  4 7656 1             CS      TWO
 0725   REF    6 LAST 580       24,3276  1 3460 1             TCF     POLTYPE              GO FIND BEST POLICY

 0726   REF    2 LAST 560       24,3277  31'654 1   PLUSV     CAE     .5ACCMNV
 0727   REF    9 LAST 580    24,3300  55'650 1             TS       .5ACCMNE
 0728   REF    5 LAST 580    24,3301  4 1515 0             CS       URGENCYQ          2 JET OPT/MAND TEST: +V AXIS
 0729   REF    6 LAST 580    24,3302  6 1516 1             AD       URGENCYR
 0730   REF  356 LAST 580    24,3303  10 000 0             CCS      A
 0731   REF    1             24,3304  6 3524 1             AD       NEGURGVM
 0732                        24,3305  1 3307 1             TCF       +2
 0733   REF    2 LAST 581    24,3306  6 3524 1             AD       NEGURGVM
 0734                        24,3307  0 0006 1             EXTEND
 0735   REF    1             24,3310  6 3314 1             BZMF     2JETS+V

 0736   REF    1             24,3311  0 3466 0  2JETSM+V   TC       VXFORM
 0737   REF  154 LAST 576    24,3312  4 7657 0  2+V.RATE   CS       ONE
 0738   REF    7 LAST 580    24,3313  1 3460 1             TCF      POLTYPE           GO FIND BEST POLICY

 0739   REF    1             24,3314  11'670 0  2JETS+V    CCS      VMANDACC          ASCENT 2-JET MANDATORY OVER-RIDE TEST
 0740   REF    1             24,3315  1 3311 0             TCF      2JETSM+V
 0741   REF    2 LAST 581    24,3316  0 3466 0             TC       VXFORM
 0742   REF  220 LAST 572    24,3317  3 7665 0             CAF      ZERO
 0743   REF    8 LAST 581    24,3320  1 3460 1             TCF      POLTYPE           GO FIND BEST POLICY

 0744   REF    7 LAST 581    24,3321  31'516 1  BURGZERO   CAE      URGENCYR          TEST FOR SECOND URGENCY ALSO ZERO
 0745                        24,3322  0 0006 1             EXTEND
 0746   REF    8 LAST 569    24,3323  1 2504 0             BZF      XTRANS            NO ROTATION NEEDED NOW

 0747                        24,3324  0 0006 1             EXTEND                     TIME SAVING A,B CALCULATION
 0748   REF    1             24,3325  7 3335 0             MP       SIN22.5
 0749   REF    4 LAST 579    24,3326  55'522 1             TS       TERMB             UR.SIN(22.5)
 0750   REF    8 LAST 581    24,3327  31'516 1             CAE      URGENCYR
 0751                        24,3330  0 0006 1             EXTEND
 0752   REF    3 LAST 579    24,3331  7 3334 1             MP       COS22.5
 0753   REF    5 LAST 579    24,3332  55'521 1             TS       TERMA
 0754   REF    1             24,3333  1 3171 1             TCF      A-B/ONLY          UR.COS(22.5)
 0755                        24,3334    35441 0  COS22.5    DEC      0.92388           COSINE OF 22.5 DEGREES
 0756                        24,3335    14176 1  SIN22.5    DEC      0.38268           SINE OF 22.5 DEGREES
 0757                        24,3336    62575 1  -TAN22.5   DEC      -.41421           NEGATIVE OF TANGENT OF 22.5 DEGREES

 0758   REF    6 LAST 581    24,3337  31'521 0  NEGBURG    CAE      TERMA             A URGENCY TEST
 0759                        24,3340  0 0006 1             EXTEND
 0760   REF    1             24,3341  6 3367 0             BZMF     NEGANEGB

 0761   REF    3 LAST 580    24,3342  31'517 0  POSANEGB   CAE      A+B
 0762                        24,3343  0 0006 1             EXTEND
 0763   REF    1             24,3344  6 3441 0             BZMF     2/4JET+Q

 0764   REF    3 LAST 580    24,3345  31'654 1  MINUSV     CAE      .5ACCMNV
 0765   REF   10 LAST 581    24,3346  55'650 1             TS       .5ACCMNE
 0766   REF    6 LAST 581    24,3347  4 1515 0             CS       URGENCYQ          2 JET OPT/MAND TEST: -V AXIS
 0767   REF    9 LAST 581    24,3350  6 1516 1             AD       URGENCYR
 0768   REF  357 LAST 581    24,3351  10 000 0             CCS      A
 0769   REF    3 LAST 581    24,3352  6 3524 1             AD       NEGURGVM
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0770                      24,3353   1 3355 0            TCF      +2
0771   REF   4 LAST 581   24,3354   6 3524 1            AD       NEGURGVM
0772                      24,3355   0 0006 1            EXTEND
0773   REF   1            24,3356   6 3362 0            BZMF     2JETS-V

0774   REF   3 LAST 581   24,3357   0 3466 0  2JETSM-V  TC       VXFORM
0775   REF 155 LAST 581   24,3360   3 7657 1  2-V.RATE  CAF      ONE
0776   REF   9 LAST 581   24,3361   1 3460 1            TCF      POLTYPE          GO FIND BEST POLICY

0777   REF   2 LAST 581   24,3362   11'670 0  2JETS-V   CCS      VMANDACC         ASCENT 2-JET MANDATORY OVER-RIDE TEST
0778   REF   1            24,3363   1 3357 1            TCF      2JETSM-V
0779   REF   4 LAST 582   24,3364   0 3466 0            TC       VXFORM
0780   REF  81 LAST 580   24,3365   3 7656 0            CAF      TWO
0781   REF  10 LAST 582   24,3366   1 3460 1            TCF      POLTYPE          GO FIND BEST POLICY

0782   REF   3 LAST 579   24,3367   31'520 1  NEGANEGB  CAE      A-B
0783                      24,3370   0 0006 1            EXTEND
0784   REF   1            24,3371   6 3414 0            BZMF     2/4JET+R

0785   REF   3 LAST 580   24,3372   31'653 0  PLUSU     CAE      .5ACCMNU
0786   REF  11 LAST 581   24,3373   55'650 1            TS       .5ACCMNE
0787   REF   7 LAST 581   24,3374   31'515 1            CAE      URGENCYQ         2 JET OPT/MAND TEST: +U AXIS
0788   REF  10 LAST 581   24,3375   6 1516 1            AD       URGENCYR
0789   REF 358 LAST 581   24,3376   10 000 0            CCS      A
0790   REF   3 LAST 580   24,3377   6 3524 1            AD       NEGURGUM
0791                      24,3400   1 3402 0            TCF      +2
0792   REF   4 LAST 582   24,3401   6 3524 1            AD       NEGURGUM
0793                      24,3402   0 0006 1            EXTEND
0794   REF   1            24,3403   6 3407 1            BZMF     2JETS+U

0795   REF   3 LAST 580   24,3404   0 3474 0  2JETSM+U  TC       UXFORM
0796   REF  25 LAST 580   24,3405   3 6165 0  2+U.RATE  CAF      THREE
0797   REF  11 LAST 582   24,3406   1 3460 1            TCF      POLTYPE          GO FIND BEST POLICY

0798   REF   2 LAST 580   24,3407   11'667 0  2JETS+U   CCS      UMANDACC         ASCENT 2-JET MANDATORY OVER-RIDE TEST
0799   REF   1            24,3410   1 3404 0            TCF      2JETSM+U
0800   REF   4 LAST 582   24,3411   0 3474 0            TC       UXFORM
0801   REF  23 LAST 580   24,3412   3 7655 0            CAF      FOUR
0802   REF  12 LAST 582   24,3413   1 3460 1            TCF      POLTYPE          GO FIND BEST POLICY

0803                      24,3414   0 0006 1  2/4JET+R  EXTEND
0804   REF   6 LAST 579   24,3415   3 1414 1            DCA      ER
0805   REF  10 LAST 579   24,3416   53'412 0            DXCH     E
0806   REF   3 LAST 579   24,3417   31'410 0            CAE      EDOT(R)
0807   REF   4 LAST 579   24,3420   55'407 1            TS       EDOT
0808   REF   3 LAST 579   24,3421   31'652 1            CAE      .5ACCMNR
0809   REF  12 LAST 582   24,3422   55'650 1            TS       .5ACCMNE
0810   REF   2 LAST 579   24,3423   3 3524 1            CAF      URM              2/4 JET URGENCY TEST +R AXIS
0811   REF  11 LAST 582   24,3424   6 1516 1            AD       URGENCYR
0812                      24,3425   0 0006 1            EXTEND
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L      @Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                                     USER'S OWN PAGE NO.  22

 0813   REF    3 LAST 569      24,3426   6 3433 0             BZMF     2JETS+R

 0814   REF    3 LAST 580      24,3427   31'446 0  4JETS+R    CAE      1/2JTSR              MOVE 1/NJETAC UNMODIFIED
 0815   REF   10 LAST 580      24,3430   55'471 0             TS       1/NJETAC
 0816   REF   14 LAST 580      24,3431   3 7664 1             CAF      FIVE
 0817   REF   13 LAST 582      24,3432   1 3460 1             TCF      POLTYPE              GO FIND BEST POLICY

 0818   REF    2 LAST 579      24,3433   11'666 1  2JETS+R    CCS      RMANDACC             ASCENT 4-JET OVER-RIDE TEST
 0819   REF    2 LAST 569      24,3434   1 3427 1             TCF      4JETS+R
 0820   REF    4 LAST 583      24,3435   31'446 0             CAE      1/2JTSR
 0821   REF   11 LAST 583      24,3436   55'471 0             TS       1/NJETAC
 0822   REF   18 LAST 580      24,3437   3 6162 1             CAF      SIX
 0823   REF   14 LAST 583      24,3440   1 3460 1             TCF      POLTYPE              GO FIND BEST POLICY

 0824   REF    3 LAST 580      24,3441   31'651 1  2/4JET+Q   CAE      .5ACCMNQ
 0825   REF   13 LAST 582      24,3442   55'650 1             TS       .5ACCMNE
 0826   REF    2 LAST 580      24,3443   3 3524 1             CAF      UQM                  2/4 JET URGENCY TEST: +Q AXIS
 0827   REF    8 LAST 582      24,3444   6 1515 1             AD       URGENCYQ
 0828                          24,3445   0 0006 1             EXTEND
 0829   REF    3 LAST 568      24,3446   6 3455 0             BZMF     2JETS+Q +2           (FIRST TWO INSTRUCTIONS UNNECESSARY)

 0830   REF    3 LAST 580      24,3447   31'445 0  4JETS+Q    CAE      1/2JTSQ              MOVE 1/NJETAC UNMODIFIED
 0831   REF   12 LAST 583      24,3450   55'471 0             TS       1/NJETAC
 0832   REF   12 LAST 579      24,3451   3 7663 0             CAF      SEVEN
 0833   REF   15 LAST 583      24,3452   1 3460 1             TCF      POLTYPE              GO FIND BEST POLICY

 0834   REF    5 LAST 580      24,3453   11'665 1  2JETS+Q    CCS      QMANDACC             ASCENT 4-JET OVER-RIDE TEST
 0835   REF    2 LAST 568      24,3454   1 3447 1             TCF      4JETS+Q
 0836   REF    4 LAST 583      24,3455   31'445 0             CAE      1/2JTSQ
 0837   REF   13 LAST 583      24,3456   55'471 0             TS       1/NJETAC
 0838   REF    1               24,3457   3 7654 1             CAF      EIGHT

 0839   REF    1               24,3460   55'523 0  POLTYPE    TS       POLRELOC
 0840                          24,3461   0 0006 1             EXTEND
 0841   REF    1               24,3462   3 3465 0             DCA      POLADR
 0842                          24,3463   52 006 0             DTCB
 0843                          24,3464    02216 0  POLADR     2CADR    POLTYPEP
C0843   REF    1               24,3465    52006 0
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L       @Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                               USER'S OWN PAGE NO.  23

R0844   SUBROUTINES UXFORM AND VXFORM CALCULATE NEEDED VALUES FOR T-JET LAW
R0845   (THEY GO OFF TO REDUCE RATE, IF NECESSARY, AND THEN DO NOT RETURN)

 0846   REF    1                24,3466  31'450 1  VXFORM    CAE     1/2JETSV          GET INVERSE OF V-JET ACCELERATION
 0847   REF   14 LAST 583       24,3467  55'471 0            TS      1/NJETAC
 0848   REF    1                24,3470  4 1411 0            CS      EQ                COMPLEMENT FOR TRANSFORMATION
 0849   REF    2 LAST 584       24,3471  55'411 0            TS      EQ
 0850   REF    3 LAST 578       24,3472  4 1424 0            CS      EDOTQ
 0851   REF    1                24,3473  1 3477 1            TCF     UVXFORM +1
 0852   REF    1                24,3474  31'447 1  UXFORM    CAE     1/2JETSU          SET INVERSE OF U-JET ACCELERATION
 0853   REF   15 LAST 584       24,3475  55'471 0            TS      1/NJETAC

 0854   REF    4 LAST 584       24,3476  31'424 1  UVXFORM   CAE     EDOTQ             TRANSFORM ANGULAR RATE TO U/V-AXIS
 0855   REF    3 LAST 578       24,3477  6 1425 0            AD      EDOTR
 0856                           24,3500  0 0006 1            EXTEND
 0857   REF    1                24,3501  7 3523 1            MP      .707
 0858   REF    5 LAST 582       24,3502  55'407 1            TS      EDOT              SAVE FOR REDUCEUV
 0859                           24,3503  0 0006 1            EXTEND
 0860   REF   21 LAST 575       24,3504  7 7655 1            MP      BIT3
 0861                           24,3505  0 0006 1            EXTEND
 0862                           24,3506  1 3510 1            BZF      +2               CHECK FOR VALUE BEYOND SCALING RANGE
 0863   REF    1                24,3507  1 3672 0            TCF     REDUCEQR          SAME AS REDUCEUV
 0864   REF  200 LAST 572       24,3510  30 001 0            CAE     L
 0865   REF    6 LAST 584       24,3511  55'407 1            TS      EDOT              SAVE RATE SCALED AT PI/16
 0866                           24,3512  0 0006 1            EXTEND
 0867                           24,3513  7 0000 0            SQUARE
 0868   REF    2 LAST 535       24,3514  55'412 0            TS      EDOT(2)           SAVE RATE SQUARED SCALED AT PI(2)/2(8)

 0869   REF    3 LAST 584       24,3515  31'411 1            CAE     EQ                TRANSFORM ANGULAR ERROR TO U/V-AXIS
 0870   REF    7 LAST 582       24,3516  6 1413 0            AD      ER
 0871                           24,3517  0 0006 1            EXTEND
 0872   REF    2 LAST 584       24,3520  7 3523 1            MP      .707
 0873   REF   11 LAST 582       24,3521  55'411 0            TS      E                 SAVE ERROR SCALED AT PI
 0874   REF  283 LAST 564       24,3522  0 0002 0            TC      Q

 0875                           24,3523   26501 1  .707      DEC     0.70711           SQRT(1/2)


 0876                           24,3524   71777 0  NEGURGUM  DEC     -.18750
 0877   REF    5 LAST 582                24,3524  NEGURGVM  EQUALS  NEGURGUM
 0878   REF    6 LAST 584                24,3524  UQM       EQUALS  NEGURGUM
 0879   REF    7 LAST 584                24,3524  URM       EQUALS  NEGURGUM
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R0880   GENERALIZED URGENCY SUBROUTINE FOR USE ON ALL PILOT AXES (P,Q,R)...

R0881   DEPENDING ON THE AXIS PROBLEM, EDOTP,EDOTQ,EDOTR IS EXPECTED TO ARRIVE IN A AND 1/2JTSP,1/2JTSQ,1/2JTSR IN
R0883   1/NJETAC.  NOTE THAT THE Q,R-AXIS PROBLEM IS EXPECTED TO DO THE R-AXIS PROBLEM FIRST (FOR EFFICIENT USE OF
R0885   ERASABLE) AND THE Q,R-AXIS PROBLEM DOES NOT USE TPSIG.
R0886   (THIS ROUTINE SHOULD BE IN THE FIXED BANK OF THE Q,R-AXIS PROBLEM SINCE IT IS CALLED ONLY ONCE FROM THE P-AXIS.)

 0888   REF    7 LAST 584      24,3525  55'407 1  URGROUTN TS       EDOT              SAVE FOR REDUCEQR
 0889                          24,3526  0 0006 1           EXTEND                     EXPECT EDOT IN A SCALED AT PI/4 RAD/SEC
 0890   REF   22 LAST 584      24,3527  7 7655 1           MP       BIT3              TRY TO RESCALE TO PI/16 RADIANS/SECOND
 0891                          24,3530  0 0006 1           EXTEND
 0892                          24,3531  1 3533 0           BZF       +2               OVERFLOW CHECK ON NEW SCALING
 0893   REF    1               24,3532  1 3666 0           TCF      REDUCERA          DISTINGUISH BETWEEN P AND Q,R
 0894   REF  201 LAST 584      24,3533  10 001 1   +2      CCS      L                 INSURE NON-ZERO EDOT (TPSIG FLAG)
 0895   REF   82 LAST 582      24,3534  6 7656 0           AD       TWO
 0896                          24,3535  1 3537 1           TCF       +2
 0897                          24,3536  4 0000 0           COM
 0898   REF    7 LAST 361      24,3537  6 7667 1   +2      AD       NEG1
 0899   REF    5 LAST 551      24,3540  55'440 1           TS       TPSIG             (FOR P-AXIS PROBLEM ONLY)
 0900   REF    8 LAST 585      24,3541  55'407 1           TS       EDOT              SAVE FOR T-JET LAW SCALED AT PI/16

 0901                          24,3542  0 0006 1           EXTEND
 0902                          24,3543  7 0000 0           SQUARE
 0903   REF    3 LAST 584      24,3544  55'412 0           TS       EDOT(2)           SCALED AT PI(2)/2(8) RAD(2)/SEC(2)

 0904                          24,3545  0 0006 1           EXTEND                     1/2JTSP,1/2JTSQ,1/2JTSR IN 1/NJETAC
 0905   REF   16 LAST 584      24,3546  7 1471 0           MP       1/NJETAC          SCALED AT 2(8)/PI SEC(2)/RAD
 0906                          24,3547  0 0006 1           EXTEND
 0907   REF    5 LAST 188      24,3550  61'415 0           SU       DB                DEADBAND SCALED AT PI RADIANS
 0908   REF    1               24,3551  55'451 1           TS       FPQR              .5(1/ACC)EDOT(2) - DB SCALED AT PI RADS

 0909   REF    4 LAST 585      24,3552  31'412 1           CAE      EDOT(2)           SCALED AT PI(2)/2(8) RAD(2)/SEC(2)
 0910                          24,3553  0 0006 1           EXTEND
 0911   REF   14 LAST 583      24,3554  7 1650 1           MP       .5ACCMNE          .5(1/ACCMIN) AT 2(8)/PI SEC(2)/RAD
 0912   REF    6 LAST 585      24,3555  6 1415 0           AD       DB                SCALED AT PI RADIANS
 0913   REF    1               24,3556  55'467 1           TS       FPQRMIN           .5(1/ACCMIN)EDOT(2) + DB AT PI RADIANS

 0914   REF    9 LAST 585      24,3557  11'407 1           CCS      EDOT              EDOT TEST ON SIGN
 0915   REF   12 LAST 584      24,3560  31'411 1           CAE      E                 P,Q,R-AXIS ERROR SCALED AT PI RADIANS
 0916                          24,3561  1 3563 0           TCF       +2
 0917   REF    1               24,3562  1 3602 1           TCF      EDOTNEG
 0918   REF    2 LAST 585      24,3563  27'451 1   +2      ADS      FPQR              E + .5(1/ACC)EDOT(2) - DB AT PI RADIANS

 0919   REF   10 LAST 585      24,3564  11'407 1  FTEST    CCS      EDOT              EDOT GUARANTEED NOT +0 OR -0
 0920   REF    3 LAST 585      24,3565  11'451 1           CCS      FPQR              FPQR GUARANTEED NOT +0
 0921   REF    1               24,3566  1 3573 1           TCF      TPSIGCHG          EDOT.G.+0, FPQR.G.+0
 0922   REF    4 LAST 585      24,3567  11'451 1           CCS      FPQR              EDOT.L.-0
 0923   REF    1               24,3570  1 3606 0           TCF      FPMINCAL          EDOT.L.-0,FPQR.G.+0/EDOT.G.+0,FPQR.L.-0
 0924   REF    2 LAST 585      24,3571  1 3606 0           TCF      FPMINCAL          EDOT.G.+0, FPQR.E.-0 (FROM FIRST CCS)
 0925   REF    2 LAST 585      24,3572  1 3573 1           TCF      TPSIGCHG          EDOT.L.-0, FPQR.L.-0
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0926   REF    6 LAST 585      24,3573  4 1440 1  TPSIGCHG CS      TPSIG          EDOT.L.-0, FPQR.E.-0 (FROM 2ND CCS)
0927   REF    7 LAST 586      24,3574  55'440 1           TS      TPSIG          (SIGN OF P-AXIS JETS IF NEEDED)
0928   REF   11 LAST 585      24,3575  31'407 0           CAE     EDOT           SCALED AT PI/16 RADIANS/SECOND
0929                          24,3576  0 0006 1           EXTEND
0930   REF   28 LAST 480      24,3577  7 7645 0           MP      BIT11          SCALE TO PI RADIANS/SECOND
0931   REF    5 LAST 585      24,3600  6 1451 0           AD      FPQR           (IMPLICIT MULT OF FPQR BY 1/SEC)
0932   REF    1               24,3601  1 3626 1           TCF     URGMULT        THIS URGENCY = (1/ACC)(FPQR+EDOT)

0933   REF    6 LAST 586      24,3602  4 1451 1  EDOTNEG  CS      FPQR           SCALED AT PI RADIANS
0934   REF   13 LAST 585      24,3603  6 1411 1           AD      E
0935   REF    7 LAST 586      24,3604  55'451 1           TS      FPQR           E - .5(1/ACC)EDOT(2) + DB
0936   REF    1               24,3605  1 3564 1           TCF     FTEST

0937   REF    8 LAST 586      24,3606  11'451 1  FPMINCAL CCS     FPQR           NECESSARY RETEST ON FPQR
0938   REF    2 LAST 585      24,3607  4 1467 1           CS      FPQRMIN
0939                          24,3610  1 3612 0           TCF      +2            E - .5(1/ACCMIN)EDOT(2) - DB
0940   REF    3 LAST 586      24,3611  31'467 0           CAE     FPQRMIN
0941   REF   14 LAST 586      24,3612  6 1411 1           AD      E              E + .5(1/ACCMIN)EDOT(2) + DB
0942   REF    4 LAST 586      24,3613  55'467 1           TS      FPQRMIN        (SCALED AT PI RADIANS)

0943   REF   12 LAST 586      24,3614  11'407 1           CCS     EDOT           EDOT    GUARANTEED NOT +0 OR -0
0944   REF    5 LAST 586      24,3615  11'467 1           CCS     FPQRMIN        FPQRMIN GUARANTEED NOT +0 (CALL IT F)
0945   REF    1               24,3616  1 3623 1           TCF     ZEROURG        EDOT.G.+0, F.G.+0
0946   REF    6 LAST 586      24,3617  11'467 1           CCS     FPQRMIN        EDOT.L.-0
0947   REF    1               24,3620  1 3625 1           TCF     NORMURG        EDOT.L.-0, F.G.+0 / EDOT.G.+0, F.L.-0
0948   REF    2 LAST 586      24,3621  1 3625 1           TCF     NORMURG        EDOT.G.+0, F.E.-0 (FROM FIRST CCS)
0949   REF    2 LAST 586      24,3622  1 3623 1           TCF     ZEROURG        EDOT.L.-0, F.L.-0
0950   REF  221 LAST 581      24,3623  3 7665 0  ZEROURG  CAF     ZERO           EDOT.L.-0, F.E.-0 (FROM SECOND CCS)
0951   REF    1               24,3624  1 3642 0           TCF     URGSTORE       THIS URGENCY ZERO (IN COAST REGIAN)

0952   REF    7 LAST 586      24,3625  31'467 0  NORMURG  CAE     FPQRMIN        THIS URGENCY FPQRMIN(1/ACC)
0953                          24,3626  0 0006 1  URGMULT  EXTEND
0954   REF   17 LAST 585      24,3627  7 1471 0           MP      1/NJETAC
0955                          24,3630  0 0006 1           EXTEND                 SCALE FROM 2(9) TO 2(4) SECONDS
0956   REF   41 LAST 570      24,3631  7 7652 0           MP      BIT6           1/NJETAC = 1/2JETAC, WANT 1/1JETAC
0957                          24,3632  0 0006 1           EXTEND
0958   REF    1               24,3633  1 3641 0           BZF     URGTOA
0959   REF  359 LAST 582      24,3634  10 000 0           CCS     A
0960   REF   35 LAST 572      24,3635  3 7637 1           CA      POSMAX
0961   REF    2 LAST 586      24,3636  1 3642 0           TCF     URGSTORE
0962   REF   36 LAST 586      24,3637  4 7637 0           CS      POSMAX
0963   REF    3 LAST 586      24,3640  1 3642 0           TCF     URGSTORE
0964   REF  202 LAST 585      24,3641  3 0001 0  URGTOA   CA      L
0965   REF  284 LAST 584      24,3642  0 0002 0  URGSTORE TC      Q              *** RETURN ***
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P0966   GENERALIZED T-JET LAW SUBROUTINE FOR USE BY BOTH THE P-AXIS AND Q,R-AXES PROBLEMS (ONCE EACH)...

R0968   DEPENDING ON THE AXIS ABOUT WHICH ROTATION IS DEEMED MOST URGENT, 1/JACC FOR THAT AXIS IS EXPECTED IN 1/NJETAC
R0970   AND THE CORRESPONDING VALUES FOR E, EDOT, AND EDOT(2) ARE ALSO EXPECTED TO BE SET UP IN ADVANCE.
R0972   (THIS ROUTINE MAY RESIDE IN THE FIXED BANK OF EITHER THE P-AXIS OR Q,R-AXIS PROBLEM.)

R0974   ***** IMPORTANT NOTICE *****

R0975       NOTE THAT TJETLOC IS THE LOCAL ENTRY POINT FOR THIS PROGRAM AND TJETLAW IS THE CROSS-BANK ENTRY.  SEE BELOW
R0977   FOR THE TWO CALLING SEQUENCES FOR OPTIMAL USE AND BE ASSURED THAT FOR EITHER CASE ISWRETRN MUST BE USED AND
R0979   RUPTREG3 CONTAINS THE EVENTUAL RETURN ADDRESS.

R0980   LOCAL CALL:
R0981              TC      TJETLOC
R0982              TCF     NO ROTATION JETS
R0983              TS      TIME CALCULATED

R0984   CROSS-BANK CALL:
R0985              CAF     TJETLAWCADR
R0986              TC      ISWCALL
R0987              TCF     NO ROTATION JETS
R0988              TS      TIME CALCULATED


R0989   ***** VERY IMPORTANT NOTICE *****

R0990   SINCE THE Q,R-AXES SWITCHED FIXED BANK BECAME VERY FULL (DUE TO THE ADDITION OF RATE-HOLD MODE AND A BETTER
R0992   RCS-GTS INTERFACE), THE LOCAL CALL AND LOCAL ENTRY POINT FOR THE T-JET LAW HAVE BEEN DELETED AS OF REVISION 7
R0994   OF AURORA (BY JON ADDELSTON 10/24/66).


R0995   FOR CONVENIENCE, WE INCLUDE HERE THE CALL FROM THE Q,R-AXIS PROBLEM:

 0996                          24,3643              BANK     24

 0997   REF    2 LAST 574    24,3643   51644 0  QR-JETLW CADR     TJET-LAW        CADR OF Q,R-ENTRY TO TJETLAW SUBROUTINE

 0998   REF    7 LAST 578    24,3644  0 4177 1  TJET-LAW TC       T6JOBCHK        CHECK T6 CLOCK RUPT BEFORE SUBROUTINE

 0999   REF    1             24,3645  3 3643 0           CAF      QR-JETLW        T-JETLAW CALLING SEQUENCE (LIKE P-AXIS)
 1000   REF    3 LAST 552    24,3646  0 4162 0           TC       ISWCALL         (IN INTERBANK COMMUNICATION LOG SECTION)
 1001   REF    9 LAST 581    24,3647  1 2504 0           TCF      XTRANS          GO TO XTRANS SINCE NO ROTATION IS USED
 1002   REF   10 LAST 571    24,3650   55626 0           TS       TQR             SAVE CALCULATED TIME FOR THE TORQUE
 1003   REF    3 LAST 570    24,3651  1 2554 0           TCF      TORQUEV         VECTOR RECONSTRUCTION PROBLEM


R1004                        24,1000  0 0006 1  TJETLOC  EXTEND                   LOCAL ENTRY FAKES CROSS-BANK IN SMALL DT
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R1006                       24,1001  22 076 0            QXCH    RUPTREG3         SAVE RETURN WHERE ISWCALL DOES
R1008                       24,1002  3 4174 1            CAF     ISWRETRN +3      GET CADR OF RUPTREG3 FROM TC INSTRUCTION
R1010                       24,1003  54 002 1            TS      Q                SO TC Q GOES TO RUPTREG3 FOR RETURN

 1012                                25,2000             BANK    25

 1013  REF  13 LAST 586     25,2000  4 1407 1  TJETLAW   CS      EDOT             TEST EDOT SIGN
 1014                       25,2001  0 0006 1            EXTEND
 1015                       25,2002  6 2006 0            BZMF     +4
 1016  REF  14 LAST 588     25,2003  55'407 1            TS      EDOT             SIGNS OF E AND EDOT CHANGED IF EDOT NEG
 1017  REF  15 LAST 586     25,2004  4 1411 0            CS      E                TO CONSIDER FUNCTIONS IN UPPER HALF OF
 1018  REF  16 LAST 588     25,2005  55'411 0            TS      E                THE E,EDOT PHASE PLANE

 1019  REF   5 LAST 585     25,2006  31'412 1            CAE     EDOT(2)          SCALED AT PI(2)/2(8) RAD(2)/SEC(2)
 1020                       25,2007  0 0006 1            EXTEND                   (1/NJETAC HAS BEEN SET FOR N JETS)
 1021  REF  18 LAST 586     25,2010  7 1471 0            MP      1/NJETAC         SCALED AT 2(8)/PI SEC(2)/RAD
 1022                       25,2011  0 0006 1            EXTEND
 1023  REF  40 LAST 575     25,2012  7 7642 1            MP      BIT14            .5EDOT(2)/NJETACC SCALED AT PI RADIANS
 1024  REF  17 LAST 588     25,2013  6 1411 1            AD      E                SCALED AT PI RADIANS (ERROR)
 1025                       25,2014  0 0006 1            EXTEND
 1026  REF   7 LAST 585     25,2015  61'415 0            SU      DB               SCALED AT PI RADIANS (DEADBAND)
 1027  REF   1              25,2016  55'454 1            TS      HDAP             E + .5EDOT(2)/NJETACC - DB

 1028                       25,2017  0 0006 1            EXTEND
 1029  REF   1              25,2020  6 2070 1            BZMF    NEGHDAP

 1030  REF  15 LAST 588     25,2021  31'407 0            CAE     EDOT             SCALED AT PI/16 RAD/SEC (RATE)
 1031                       25,2022  0 0006 1            EXTEND
 1032  REF  19 LAST 588     25,2023  7 1471 0            MP      1/NJETAC         SCALED AT 2(8)/PI SEC(2)/RAD (ACC)(-1)
 1033  REF   7 LAST 581     25,2024  55'521 1            TS      TERMA            SCALED AT 2(4) SEC (CNTRL SMPL PERIOD)
 1034  REF   1              25,2025  6 2205 1            AD      NEGCSP           EDOT/NJETACC - CSP SCALED AT 16 SECONDS

 1035                       25,2026  0 0006 1            EXTEND
 1036                       25,2027  6 2032 1            BZMF     +3

 1037  REF  41 LAST 588     25,2030  3 7642 0  MAXTJET   CAF     BIT14            (1/2) IS LIKE POSMAX AT THIS SCALING
 1038  REF   1              25,2031  1 2057 0            TCF     NORMRETN         (OVERFLOW IS THUS PREVENTED)

 1039  REF   2 LAST 588     25,2032  4 1454 1            CS      HDAP             -DBMINIMP + E + EDOT(2)/NJETACC - DB
 1040  REF   4 LAST 560     25,2033  6 1647 0            AD      MINIMPDB         SCALED AT PI RADIANS
 1041                       25,2034  0 0006 1            EXTEND
 1042  REF   1              25,2035  6 2116 0            BZMF    MAINBRCH

 1043  REF   8 LAST 588     25,2036  31'521 0            CAE     TERMA            EDOT/NJETACC - .5TJMIN SCALED AT 16 SECS
 1044  REF   1              25,2037  6 2211 1            AD      -20MS            - 20 MS SCALED AT 16.
 1045                       25,2040  0 0006 1            EXTEND
 1046  REF   1              25,2041  6 2044 0            BZMF    TJMIN

 1047  REF   1              25,2042  6 2210 0            AD      23.75MS          WE GET TERMA + 3.75 MS.
 1048  REF   1              25,2043  1 2164 1            TCF     TJETSCAL
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1049  REF   1              25,2044  4 2067 0  TJMIN      CS      PAXCALL          WE KNOW WE DO P AXIS SINCE WE HAVE RUPT-
1050  REF  12 LAST 539     25,2045  6 0076 0             AD      RUPTREG3          REG3 = T-JETLAW +3(Q-AXIS CALL NOT AT
1051                       25,2046  0 0006 1             EXTEND                    SAME LOCATION-- WE HOPE - AND INSURE.).
1052  REF   1              25,2047  1 2061 0             BZF     WEDOP
1053  REF   6 LAST 571     25,2050  31'620 1             CAE     NO.QJETS         NO. OF Q JETS ON
1054                       25,2051  0 0006 1             EXTEND
1055  REF   1              25,2052  1 2063 1             BZF     WEDOR
1056  REF   5 LAST 571     25,2053  31'621 0             CAE     NO.RJETS         NO. OF R JETS ON
1057                       25,2054  0 0006 1             EXTEND
1058  REF   1              25,2055  1 2065 1             BZF     WEDOQ
1059  REF   1              25,2056  3 2206 1  DOTJMIN    CAF     +TJMINT6
1060  REF  13 LAST 589     25,2057  24 076 0  NORMRETN   INCR    RUPTREG3         *** RETURN +1 ***
1061  REF 285 LAST 586     25,2060  0 0002 0             TC      Q                BACK TO ISWRETRN
1062  REF  14 LAST 575     25,2061  55'416 1  WEDOP      TS      OMEGAP
1063  REF   1              25,2062  1 2056 1             TCF     DOTJMIN
1064  REF  11 LAST 578     25,2063  55'421 0  WEDOR      TS      OMEGAR
1065  REF   2 LAST 589     25,2064  1 2056 1             TCF     DOTJMIN
1066  REF  11 LAST 578     25,2065  55'417 0  WEDOQ      TS      OMEGAQ
1067  REF   3 LAST 589     25,2066  1 2056 1             TCF     DOTJMIN
1068  REF   2 LAST 552     25,2067   02666 0  PAXCALL    GENADR  T-JETLAW +3
1069  REF   6 LAST 588     25,2070  31'412 1  NEGHDAP    CAE     EDOT(2)          SCALED AT PI(2)/2(8) RAD(2)/SEC(2)
1070                       25,2071  0 0006 1             EXTEND
1071  REF  15 LAST 585     25,2072  7 1650 1             MP      .5ACCMNE         .5(1/ACCMIN) AT 2(8)/PI SEC(2)/RAD
1072  REF  18 LAST 588     25,2073  6 1411 1             AD      E                SCALED AT PI RADIANS (ERROR)
1073  REF   8 LAST 588     25,2074  6 1415 0             AD      DB               SCALED AT PI RADIANS (DEADBAND)
1074  REF   5 LAST 560     25,2075  6 1646 1             AD      DBMINIMP
1075                       25,2076  0 0006 1             EXTEND
1076                       25,2077  6 2101 0             BZMF      +2
1077  REF 286 LAST 589     25,2100  0 0002 0             TC      Q                *** RETURN *** (NO JETS)

1078  REF   1              25,2101  4 2212 0   +2        CS      MAXRATE          10 DEG/SEC SCALED AT PI/16 RAD/SEC
1079  REF  16 LAST 588     25,2102  6 1407 0             AD      EDOT             EDOT - MAXRATE
1080                       25,2103  0 0006 1             EXTEND
1081                       25,2104  6 2106 1             BZMF      +2
1082  REF 287 LAST 589     25,2105  0 0002 0             TC      Q                *** RETURN *** (NO JETS)

1083  REF  17 LAST 589     25,2106  4 1407 1   +2        CS      EDOT             SCALED AT PI/16 RAD/SEC (RATE)
1084                       25,2107  0 0006 1             EXTEND
1085  REF  20 LAST 588     25,2110  7 1471 0             MP      1/NJETAC         SCALED AT 2(8)/PI SEC(2)/RAD (ACC)(-1)
1086  REF   9 LAST 588     25,2111  55'521 1             TS      TERMA            -EDOT/NJETACC SCALED AT 2(4) SECONDS

1087  REF   3 LAST 588     25,2112  4 1454 1             CS      HDAP             - E + .5EDOT(2)/NJETACC + DB
1088  REF  19 LAST 589     25,2113  6 1411 1             AD      E
1089  REF  20 LAST 589     25,2114  6 1411 1             AD      E                TWICE ERROR NEGATES E OF HDAP(OLD)
1090  REF   5 LAST 588     25,2115  6 1647 0             AD      MINIMPDB
1091  REF   4 LAST 589     25,2116  55'454 1  MAINBRCH   TS      HDAP             -HDAP(OLD) + 2E + DBMINIMP AT PI RADS

1092  REF  21 LAST 589     25,2117  31'471 1             CAE     1/NJETAC         SCALED AT 2(8)/PI SEC(2)/RAD
1093                       25,2120  0 0006 1             EXTEND
1094  REF  42 LAST 588     25,2121  7 7642 1             MP      BIT14            (1/2)(1/NJETAC)
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1095  REF  16 LAST 589    25,2122  6 1650 0            AD       .5ACCMNE
1096  REF   1             25,2123  55'456 0            TS       DENOM        .5(1/NJETACC) + .5(1/ACCMIN) AT 2(8)/PI

1097                      25,2124  0 0006 1            EXTEND
1098  REF   1             25,2125  7 2213 1            MP       MAXRATE2     SCALED AT PI(2)/2(8) RAD(2)/SEC(2)
1099  REF   5 LAST 589    25,2126  6 1454 0            AD       HDAP         DENOM.MAXRATE(2) + HDAP AT PI RADIANS
1100                      25,2127  0 0006 1            EXTEND
1101  REF   1             25,2130  6 2170 0            BZMF     NOROOT

1102  REF   6 LAST 590    25,2131  31'454 0            CAE      HDAP         SCALED AT PI RADIANS
1103                      25,2132  0 0006 1            EXTEND
1104  REF   2 LAST 590    25,2133  11'456 0            DV       DENOM        SCALED AT 2(8)/PI SEC(2)/RAD(2)
1105                      25,2134  0 0006 1            EXTEND
1106  REF  22 LAST 589    25,2135  7 1471 0            MP       1/NJETAC
1107                      25,2136  0 0006 1            EXTEND
1108  REF  23 LAST 590    25,2137  7 1471 0            MP       1/NJETAC
1109  REF   5 LAST 581    25,2140  55'522 1            TS       TERMB        -(HDAP/DENOM)(1/NJETACC)(2) AT 2(8) SECS

1110  REF   2 LAST 588    25,2141  3 2205 1            CAF      NEGCSP       SCALED AT 2(4) SECONDS
1111  REF  10 LAST 589    25,2142  6 1521 0            AD       TERMA
1112                      25,2143  0 0006 1            EXTEND
1113                      25,2144  7 0000 0            SQUARE                SCALED AT 2(8) SECONDS
1114  REF   6 LAST 590    25,2145  6 1522 0            AD       TERMB
1115                      25,2146  0 0006 1            EXTEND                (TERMA - CSP)(2) + TERMB
1116  REF   1             25,2147  6 2030 0            BZMF     MAXTJET
1117  REF   1             25,2150  3 2207 0            CAF      -TJMIN16
1118  REF  11 LAST 590    25,2151  6 1521 0            AD       TERMA        TERMA - TJMIN SCALED AT 2(4) SECONDS
1119                      25,2152  0 0006 1            EXTEND
1120  REF   1             25,2153  6 2175 0            BZMF     MAYNOJET

1121                      25,2154  0 0006 1  PREROOT   EXTEND                MUST SAVE Q .

1122  REF   4 LAST 581    25,2155  23'517 0            QXCH     A+B
1123  REF   8 LAST 587    25,2156  0 4177 1            TC       T6JOBCHK
1124  REF   7 LAST 590    25,2157  4 1522 1            CS       TERMB
1125  REF   1             25,2160  0 4275 0            TC       SPROOT       SQRT(-TERMB) SCALED AT 2(4) SECONDS

1126                      25,2161  0 0006 1            EXTEND                MUST RESTORE OLD Q AFTER SPROOT
1127  REF   5 LAST 590    25,2162  23'517 0            QXCH     A+B

1128  REF  12 LAST 590    25,2163  6 1521 0  TJSUM     AD       TERMA        TERMA + SQRT(-TERMB)
1129                      25,2164  6 0000 1  TJETSCAL  DOUBLE                NOW SCALED AT 2(3) SECONDS
1130                      25,2165  0 0006 1            EXTEND
1131  REF   1             25,2166  7 2215 1            MP       25/32QR      SCALED T O 16/25 2(4) SECONDS.
1132  REF   2 LAST 588    25,2167  1 2057 0            TCF      NORMRETN     *** RETURN +1 ***

1133  REF   2 LAST 589    25,2170  3 2212 1  NOROOT    CAF      MAXRATE
1134  REF   1             25,2171  6 2214 1            AD       .6DEG/SC     MAXRATE + DEL SCALED AT PI/16 RAD/SEC
1135                      25,2172  0 0006 1            EXTEND
1136  REF  24 LAST 590    25,2173  7 1471 0            MP       1/NJETAC     SCALED AT 2(8)/PI SEC(2)/RAD
```

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1137  REF   1             25,2174  1 2163 0             TCF     TJSUM          SCALED AT 2(4) RADIANS

1138  REF   2 LAST 590    25,2175  3 2207 0  MAYNOJET   CAF     -TJMIN16
1139  REF  13 LAST 590    25,2176  6 1521 0             AD      TERMA          TERMA - TJMIN SCALED AT 2(4) SECONDS
1140                      25,2177  0 0006 1             EXTEND
1141                      25,2200  7 0000 0             SQUARE                 SCALED AT 2(8) SEC(2)
1142  REF   8 LAST 590    25,2201  6 1522 0             AD      TERMB
1143                      25,2202  0 0006 1             EXTEND
1144  REF   1             25,2203  6 2154 0             BZMF    PREROOT        (TERMA - TJMIN)(2) + TERMB AT 2(8)
1145  REF 288 LAST 589    25,2204  0 0002 0             TC      Q              *** RETURN *** (NO JETS)

1146                      25,2205    77631 0  NEGCSP    DEC     -.00625        100 MS   SCALED AT 2(4) SECONDS
1147                      25,2206    00014 1  +TJMINT6  DEC     +.00073
1148                      25,2207    77767 1  -TJMIN16  DEC     -.00047
1149  REF   3 LAST 591               25,2207  -TJMINQR  EQUALS  -TJMIN16
1150                      25,2210    00030 1  23.75MS   DEC     0.00148        23.75 MS SCALED AT 16 SECONDS.
1151                      25,2211    77753 0  -20MS     DEC     -.00125        - 20 MS SCALED AT 16 SECONDS.
1152                      25,2212    34344 0  MAXRATE   DEC     0.88889        10 DEGREES/SECOND SCALED AT PI/16
1153                      25,2213    31221 1  MAXRATE2  DEC     0.79012        100 DEG(2)/SEC(2) SCALED AT PI(2)/2(8)
1154                      25,2214    01552 1  .6DEG/SC  DEC     0.05333        6/10 DEGREES/SECOND SCALED AT PI/16
1155                      25,2215    31000 0  25/32QR   DEC     0.78125
```

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R1156   THESE TWO SUBROUTINES TRANSFORM EDOTQ,EDOTR INTO THE U/V-AXIS (RESPECTIVELY) FOR THE RATE COMMAND MODE (ONLY).
R1158   VALUE IS STORED IN EDOTGEN SCALED AT PI/4 RADIANS/SECOND.

 1159                              24,3652               BANK    24

 1160   REF   2 LAST 584  24,3652  31,447 1  EDOTUGEN CAE     1/2JETSU        FOR U-AXIS TRANSFORMATION
 1161   REF  25 LAST 590  24,3653  55,471 0           TS      1/NJETAC
 1162   REF   5 LAST 584  24,3654  31,424 1           CAE     EDOTQ
 1163                     24,3655  1 3661 1           TCF      +4
 1164   REF   2 LAST 584  24,3656  31,450 1  EDOTVGEN CAE     1/2JETSV        FOR V-AXIS TRANSFORMATION
 1165   REF  26 LAST 592  24,3657  55,471 0           TS      1/NJETAC
 1166   REF   6 LAST 592  24,3660  4 1424 0           CS      EDOTQ
 1167   REF   4 LAST 584  24,3661  6 1425 0           AD      EDOTR
 1168                     24,3662  0 0006 1           EXTEND
 1169   REF   3 LAST 584  24,3663  7 3523 1           MP      .707
 1170   REF   6 LAST 569  24,3664  55,443 1           TS      RATEDIF
 1171   REF 289 LAST 591  24,3665  0 0002 0           TC      Q



R1172   THESE PROGRAMS REDUCE THE RATE ERROR TO 10.6 DEGREES/SECOND.

 1173   REF  18 LAST 589  24,3666  4 1407 1  REDUCERA CS      EDOT            TEST FOR P-AXIS PROBLEM
 1174   REF   4 LAST 552  24,3667  6 1423 0           AD      EDOTP           EXACT MATCH MEANS P-AXIS
 1175                     24,3670  0 0006 1           EXTEND
 1176   REF   1           24,3671  1 3703 1           BZF     REDUCEP         P-AXIS SUM IS ALWAYS MINUS ZERO

 1177   REF   1           24,3672  0 3715 1  REDUCEQR TC      REDUCESC        GET SHRINK FACTOR
 1178                     24,3673  0 0006 1           EXTEND                  SHRINK Q-AXIS COMPONENT
 1179   REF   7 LAST 592  24,3674  7 1424 0           MP      EDOTQ
 1180   REF   6 LAST 568  24,3675  55,424 0           TS      QRATEDIF

 1181   REF   5 LAST 592  24,3676  31,425 0           CAE     EDOTR           SHRINK R-AXIS COMPONENT
 1182                     24,3677  0 0006 1           EXTEND
 1183   REF  19 LAST 592  24,3700  7 1407 1           MP      EDOT
 1184   REF   9 LAST 569  24,3701  55,425 1           TS      RRATEDIF

 1185   REF   2 LAST 567  24,3702  1 2352 0           TCF     OBEYQRRC

 1186   REF   2 LAST 592  24,3703  0 3715 1  REDUCEP  TC      REDUCESC        GET SHRINK FACTOR
 1187                     24,3704  0 0006 1           EXTEND                  SHRINK P-AXIS COMPONENT
 1188   REF   5 LAST 592  24,3705  7 1423 1           MP      EDOTP
 1189   REF   6 LAST 592  24,3706  55,423 1           TS      EDOTP
 1190   REF   8 LAST 586  24,3707  55,440 1           TS      TPSIG

 1191                     24,3710  0 0006 1           EXTEND
 1192                     24,3711  3 3714 0           DCA      +2
 1193                     24,3712  52 006 0           DTCB
 1194                     24,3713   02424 1           2CADR   OBEYRAPE
C1194   REF   1           24,3714   46006 0
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 1195   REF   1               24,3715   3 3722 0  REDUCESC CAF     10.6D/S         SCALED AT PI/4
 1196                         24,3716   0 0006 1           EXTEND
 1197   REF  20 LAST 592      24,3717  11'407 1            DV      EDOT            RESULT SCALED AT 1
 1198   REF  21 LAST 593      24,3720  55'407 1            TS      EDOT            SAVE FACTOR IN EDOT FOR R SHRINKAGE
 1199   REF 290 LAST 592      24,3721   0 0002 0           TC      Q               *** RETURN ***

 1200                         24,3722    07313 1  10.6D/S  DEC     0.23111         10.6 DEGREES/SECOND SCALED AT PI/4


 1201                                   24,3723  ENDDAP24 EQUALS
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L       JET FAILURE CONTROL LOGIC                                                   USER'S OWN PAGE NO.   1
 0001                                  25,2216              BANK    25
 0002   REF    5 LAST 562                   E6              EBANK=  DT


R0003   DETERMINE MODE - +XTRANS, -XTRANS, ASCENT, MANDATORY ROTATION, OR NORMAL

 0004   REF   33 LAST 570     25,2216  3 7651 1  POLTYPEP CA      BIT7            CHECK +X TRANSLATION
 0005                         25,2217  0 0006 1           EXTEND
 0006                         25,2220  02 031 1           RAND    31
 0007                         25,2221  0 0006 1           EXTEND
 0008   REF    1              25,2222  1 2245 1           BZF     POSXPOLS

 0009   REF   25 LAST 570     25,2223  3 7650 0           CA      BIT8            CHECK -X TRANSLATION
 0010                         25,2224  0 0006 1           EXTEND
 0011                         25,2225  02 031 1           RAND    31
 0012                         25,2226  0 0006 1           EXTEND
 0013   REF    1              25,2227  1 2242 0           BZF     NEGXPOLS        CHECK U,V-MANDATORY AND 4-JET Q,R

 0014   REF   40 LAST 577     25,2230  3 0765 0           CA      DAPBOOLS        CHECK ASCENT BIT OF DAPBOOLS
 0015   REF   26 LAST 594     25,2231  7 7650 1           MASK    BIT8
 0016                         25,2232  0 0006 1           EXTEND
 0017   REF    1              25,2233  1 2237 1           BZF     NORMATT

 0018   REF    2 LAST 583     25,2234  51'523 1  ASCFLGHT INDEX   POLRELOC
 0019   REF    1              25,2235  3 3013 0           CA      ASCNTPOL
 0020                         25,2236  1 2247 0           TCF      +9D
 0021   REF    3 LAST 594     25,2237  51'523 1  NORMATT  INDEX   POLRELOC
 0022   REF    1              25,2240  3 2773 0           CA      NORMLPOL
 0023                         25,2241  1 2247 0           TCF      +6
 0024   REF    4 LAST 594     25,2242  51'523 1  NEGXPOLS INDEX   POLRELOC
 0025   REF    1              25,2243  3 3053 1           CA      -XPOLADR
 0026                         25,2244  1 2247 0           TCF      +3
 0027   REF    5 LAST 594     25,2245  51'523 1  POSXPOLS INDEX   POLRELOC
 0028   REF    1              25,2246  3 3033 1           CA      +XPOLADR
 0029   REF    6 LAST 594     25,2247  55'523 0           TS      POLRELOC        RESET POLRELOC TO NEW TABLE ENTRY

 0030   REF    7 LAST 594     25,2250  51'523 1           INDEX   POLRELOC        USE POLRELOC POINTER TO FIND AND
 0031   REF    1              25,2251  3 2364 1           CA      POLTAB1         EXTRACT THE NUMBER OF TESTABLE
 0032                         25,2252  0 0006 1           EXTEND                  POLICIES AND SAVE IN LOOPCTR
 0033   REF   34 LAST 594     25,2253  7 7651 0           MP      BIT7
 0034   REF   13 LAST 583     25,2254  7 7663 1           MASK    SEVEN
 0035   REF    1              25,2255  55'524 1           TS      LOOPCTR
 0036                         25,2256  1 2262 1           TCF      +4

 0037   REF    2 LAST 594     25,2257  55'524 1  POLLOOP  TS      LOOPCTR         RESTORE COUNTER
 0038                         25,2260  0 0006 1           EXTEND                  CHANGE EFFECTIVE ADDRESS TO NEXT POLICY
 0039   REF    8 LAST 594     25,2261  27'523 0           DIM     POLRELOC
 0040   REF    9 LAST 594     25,2262  51'523 1           INDEX   POLRELOC
 0041   REF    2 LAST 594     25,2263  3 2364 1           CA      POLTAB1         PICK UP ROTATIONAL JETS
 0042   REF  203 LAST 586     25,2264  54 001 1           TS      L
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L        JET FAILURE CONTROL LOGIC                                                          USER'S OWN PAGE NO.   2

 0043    REF  10 LAST 594   25,2265  51'523 1            INDEX   POLRELOC
 0044    REF   1            25,2266  3 2564 1            CA      POLTAB2        PICK UP TRANSLATIONAL JETS (MAY BE NONE)
 0045                       25,2267  0 0006 1            EXTEND                 GET ALL JETS USED IN THIS POLICY
 0046    REF 204 LAST 594   25,2270  05 001 0            WOR     L              (LOW ORDER 8 BITS ONLY)
 0047    REF   2 LAST 558   25,2271  7 1512 1            MASK    CH5MASK        TEST FOR POLICY FEASIBILITY -
 0048    REF 360 LAST 586   25,2272  10 000 0            CCS     A              REJECT POLICY IF ANY OF THE JETS IT USES
 0049                       25,2273  1 2275 1            TCF      +2            ARE THOUGHT TO HAVE FAILED
 0050    REF   1            25,2274  1 2301 0            TCF     POLFND
 0051    REF   3 LAST 594   25,2275  11'524 1            CCS     LOOPCTR        TEST FOR EXISTENCE OF ADDITIONAL
 0052    REF   1            25,2276  1 2257 1            TCF     POLLOOP        TESTABLE POLICY

 0053                       25,2277  0 0006 1            EXTEND                 LAST FEASIBLE CHOICE -
 0054    REF  11 LAST 595   25,2300  27'523 0            DIM     POLRELOC       CREATE UNTESTED POLICY ADDRESS

 0055    REF  12 LAST 595   25,2301  51'523 1  POLFND    INDEX   POLRELOC
 0056    REF   3 LAST 594   25,2302  3 2364 1            CA      POLTAB1
 0057    REF  10 LAST 471   25,2303  7 5235 1            MASK    LOW8           GET CHANNEL 5 BIT CONFIGURATION FOR
 0058    REF  37 LAST 572   25,2304  6 7641 0            AD      BIT15          SET SIGN FOR Q,R AXIS FLAG
 0059    REF   5 LAST 572   25,2305  55'501 0            TS      JTSONNOW       JETS TO BE TURNED ON IMMEDIATELY
 0060    REF  13 LAST 595   25,2306  51'523 1            INDEX   POLRELOC
 0061    REF   4 LAST 595   25,2307  3 2364 1            CA      POLTAB1
 0062                       25,2310  0 0006 1            EXTEND
 0063    REF  38 LAST 569   25,2311  7 7654 0            MP      BIT4           GET CODE FOR NUMBER OF TORQUING JETS
 0064    REF 361 LAST 595   25,2312  10 000 0            CCS     A
 0065                       25,2313  1 2315 0            TCF      +2
 0066    REF   1            25,2314  1 2326 0            TCF     TORKSETP       N=2, CODE=0
 0067    REF 362 LAST 595   25,2315  10 000 0            CCS     A
 0068    REF   1            25,2316  1 2322 1            TCF     1/4JETAC
 0069    REF  27 LAST 592   25,2317  3 1471 1            CA      1/NJETAC       N=4, CODE=2
 0070                       25,2320  6 0000 1            DOUBLE                 N = 1, CODE = 1
 0071    REF   1            25,2321  1 2325 0            TCF     NJETCORR
 0072    REF  28 LAST 595   25,2322  3 1471 1  1/4JETAC  CA      1/NJETAC       N = 4, CODE = 2
 0073                       25,2323  0 0006 1            EXTEND
 0074    REF  43 LAST 589   25,2324  7 7642 1            MP      BIT14
 0075    REF  29 LAST 595   25,2325  55'471 0  NJETCORR  TS      1/NJETAC

 0076    REF  14 LAST 595   25,2326  51'523 1  TORKSETP  INDEX   POLRELOC
 0077    REF   2 LAST 595   25,2327  3 2564 1            CA      POLTAB2
 0078                       25,2330  0 0006 1            EXTEND
 0079    REF  39 LAST 595   25,2331  7 7654 0            MP      BIT4           GET CODE FOR NUMBER OF Q-JETS
 0080    REF 363 LAST 595   25,2332  50 000 1            INDEX   A
 0081    REF   1            25,2333  3 2355 0            CA      TORKTABL       GET NUMBER OF Q-JETS FROM TABLE AND
 0082    REF   7 LAST 589   25,2334  55'620 0            TS      NO.QJETS       SAVE FOR TORQUE VECTOR RECONSTRUCTION
 0083    REF 205 LAST 595   25,2335  3 0001 0            CA      L
 0084                       25,2336  0 0006 1            EXTEND
 0085    REF  40 LAST 595   25,2337  7 7654 0            MP      BIT4           GET CODE FOR NUMBER OF R-JETS
 0086    REF 364 LAST 595   25,2340  50 000 1            INDEX   A
 0087    REF   2 LAST 595   25,2341  3 2355 0            CA      TORKTABL       GET NUMBER OF R-JETS FROM TABLE AND
 0088    REF   6 LAST 589   25,2342  55'621 1            TS      NO.RJETS       SAVE FOR TORQUE VECTOR RECONSTRUCTION
 0089    REF 206 LAST 595   25,2343  3 0001 0            CA      L
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L       JET FAILURE CONTROL LOGIC                                                     USER'S OWN PAGE NO.   3

 0090                         25,2344  0 0006 1            EXTEND
 0091   REF  23 LAST 567      25,2345  7 7647 1            MP     BIT9                GET CHANNEL 5 BIT CONFIGURATION FOR
 0092   REF  38 LAST 595      25,2346  6 7641 0            AD     BIT15               SET SIGN FOR Q,R AXIS FLAG
 0093   REF  16 LAST 572      25,2347  55'502 0            TS     JTSATCHG            JETS TO BE TURNED ON AFTER TORQUING

 0094   REF   1               25,2350  3 2354 1            CA     BBANKSET
 0095   REF 207 LAST 595      25,2351  54 001 1            TS     L
 0096   REF   4 LAST 578      25,2352  3 1514 0            CA     TJETADR
 0097                         25,2353  52 006 0            DTCB                       RETURN TO FBANK 24

 0098                         25,2354   50006 1  BBANKSET  OCTAL  50006


R0099   TABLE OF Q,R-JET NUMBERS AND DIRECTIONS FOR TORQUE RECONSTRUCTION

 0100                         25,2355   77773 1  TORKTABL  DEC    -4
 0101                         25,2356   77775 1            DEC    -2
 0102                         25,2357   77776 1            DEC    -1
 0103                         25,2360   00000 1            DEC    0
 0104                         25,2361   00001 0            DEC    +1
 0105                         25,2362   00002 0            DEC    +2
 0106                         25,2363   00004 0            DEC    +4

R0107   POLTAB1 LISTS Q,R-AXIS ROTATIONAL JET POLICIES

 0108                         25,2364   00220 1  POLTAB1   OCTAL    220               JETS  9 14  0  0 NO 2  CTR 0
 0109                         25,2365   00006 1            OCTAL      6               JETS  2  5  0  0 NO 2  CTR 0
 0110                         25,2366   00602 0            OCTAL    602               JETS  2 14  0  0 NO 2  CTR 1
 0111                         25,2367   10226 0            OCTAL  10226               JETS  2  5  9 14 NO 4  CTR 0
 0112                         25,2370   11626 0            OCTAL  11626               JETS  2  5  9 14 NO 4  CTR 3
 0113                         25,2371   00201 1            OCTAL    201               JETS  1 14  0  0 NO 2  CTR 0
 0114                         25,2372   00044 1            OCTAL     44               JETS  5 10  0  0 NO 2  CTR 0
 0115                         25,2373   00640 0            OCTAL    640               JETS 10 14  0  0 NO 2  CTR 1
 0116                         25,2374   10245 0            OCTAL  10245               JETS  1  5 10 14 NO 4  CTR 0
 0117                         25,2375   11645 0            OCTAL  11645               JETS  1  5 10 14 NO 4  CTR 3
 0118                         25,2376   00140 1            OCTAL    140               JETS 10 13  0  0 NO 2  CTR 0
 0119                         25,2377   00011 1            OCTAL     11               JETS  1  6  0  0 NO 2  CTR 0
 0120                         25,2400   00450 0            OCTAL    450               JETS  6 10  0  0 NO 2  CTR 1
 0121                         25,2401   10151 0            OCTAL  10151               JETS  1  6 10 13 NO 4  CTR 0
 0122                         25,2402   11551 0            OCTAL  11551               JETS  1  6 10 13 NO 4  CTR 3
 0123                         25,2403   00102 1            OCTAL    102               JETS  2 13  0  0 NO 2  CTR 0
 0124                         25,2404   00030 1            OCTAL     30               JETS  6  9  0  0 NO 2  CTR 0
 0125                         25,2405   00412 0            OCTAL    412               JETS  2  6  0  0 NO 2  CTR 1
 0126                         25,2406   10132 0            OCTAL  10132               JETS  2  6  9 13 NO 4  CTR 0
 0127                         25,2407   11532 0            OCTAL  11532               JETS  2  6  9 13 NO 4  CTR 3
 0128                         25,2410   00220 1            OCTAL    220               JETS  9 14  0  0 NO 2  CTR 0
 0129                         25,2411   00006 1            OCTAL      6               JETS  2  5  0  0 NO 2  CTR 0
 0130                         25,2412   00424 0            OCTAL    424               JETS  5  9  0  0 NO 2  CTR 1
 0131                         25,2413   10226 0            OCTAL  10226               JETS  2  5  9 14 NO 4  CTR 0
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0132                 25,2414  11626 0      OCTAL  11626        JETS  2  5  9 14 NO 4  CTR 3
0133                 25,2415  00044 1      OCTAL     44        JETS  5 10  0  0 NO 2  CTR 0
0134                 25,2416  00201 1      OCTAL    201        JETS  1 14  0  0 NO 2  CTR 0
0135                 25,2417  00405 0      OCTAL    405        JETS  1  5  0  0 NO 2  CTR 1
0136                 25,2420  10245 0      OCTAL  10245        JETS  1  5 10 14 NO 4  CTR 0
0137                 25,2421  11645 0      OCTAL  11645        JETS  1  5 10 14 NO 4  CTR 3
0138                 25,2422  00140 1      OCTAL    140        JETS 10 13  0  0 NO 2  CTR 0
0139                 25,2423  00011 1      OCTAL     11        JETS  1  6  0  0 NO 2  CTR 0
0140                 25,2424  00501 0      OCTAL    501        JETS  1 13  0  0 NO 2  CTR 1
0141                 25,2425  10151 0      OCTAL  10151        JETS  1  6 10 13 NO 4  CTR 0
0142                 25,2426  11551 0      OCTAL  11551        JETS  1  6 10 13 NO 4  CTR 3
0143                 25,2427  00030 1      OCTAL     30        JETS  6  9  0  0 NO 2  CTR 0
0144                 25,2430  00102 1      OCTAL    102        JETS  2 13  0  0 NO 2  CTR 0
0145                 25,2431  00520 0      OCTAL    520        JETS  9 13  0  0 NO 2  CTR 1
0146                 25,2432  10132 0      OCTAL  10132        JETS  2  6  9 13 NO 4  CTR 0
0147                 25,2433  11532 0      OCTAL  11532        JETS  2  6  9 13 NO 4  CTR 3
0148                 25,2434  04046 1      OCTAL   4046        JETS  2  5 10  0 NO 1  CTR 0
0149                 25,2435  04242 1      OCTAL   4242        JETS  2 10 14  0 NO 1  CTR 0
0150                 25,2436  04600 0      OCTAL   4600        JETS 14  0  0  0 NO 1  CTR 1
0151                 25,2437  00204 1      OCTAL    204        JETS  5 14  0  0 NO 2  CTR 0
0152                 25,2440  01604 1      OCTAL   1604        JETS  5 14  0  0 NO 2  CTR 3
0153                 25,2441  04142 1      OCTAL   4142        JETS  2 10 13  0 NO 1  CTR 0
0154                 25,2442  04052 1      OCTAL   4052        JETS  2  6 10  0 NO 1  CTR 0
0155                 25,2443  04410 0      OCTAL   4410        JETS  6  0  0  0 NO 1  CTR 1
0156                 25,2444  00110 1      OCTAL    110        JETS  6 13  0  0 NO 2  CTR 0
0157                 25,2445  01510 1      OCTAL   1510        JETS  6 13  0  0 NO 2  CTR 3
0158                 25,2446  04211 1      OCTAL   4211        JETS  1  6 14  0 NO 1  CTR 0
0159                 25,2447  04250 1      OCTAL   4250        JETS  6 10 14  0 NO 1  CTR 0
0160                 25,2450  04440 0      OCTAL   4440        JETS 10  0  0  0 NO 1  CTR 1
0161                 25,2451  00041 1      OCTAL     41        JETS  1 10  0  0 NO 2  CTR 0
0162                 25,2452  01441 1      OCTAL   1441        JETS  1 10  0  0 NO 2  CTR 3
0163                 25,2453  04230 1      OCTAL   4230        JETS  6  9 14  0 NO 1  CTR 0
0164                 25,2454  04212 1      OCTAL   4212        JETS  2  6 14  0 NO 1  CTR 0
0165                 25,2455  04402 0      OCTAL   4402        JETS  2  0  0  0 NO 1  CTR 1
0166                 25,2456  00022 1      OCTAL     22        JETS  2  9  0  0 NO 2  CTR 0
0167                 25,2457  01422 1      OCTAL   1422        JETS  2  9  0  0 NO 2  CTR 3
0168                 25,2460  04221 1      OCTAL   4221        JETS  1  9 14  0 NO 1  CTR 0
0169                 25,2461  04025 1      OCTAL   4025        JETS  1  5  9  0 NO 1  CTR 0
0170                 25,2462  04404 0      OCTAL   4404        JETS  5  0  0  0 NO 1  CTR 1
0171                 25,2463  00204 1      OCTAL    204        JETS  5 14  0  0 NO 2  CTR 0
0172                 25,2464  01604 1      OCTAL   1604        JETS  5 14  0  0 NO 2  CTR 3
0173                 25,2465  04031 1      OCTAL   4031        JETS  1  6  9  0 NO 1  CTR 0
0174                 25,2466  04121 1      OCTAL   4121        JETS  1  9 13  0 NO 1  CTR 0
0175                 25,2467  04500 0      OCTAL   4500        JETS 13  0  0  0 NO 1  CTR 1
0176                 25,2470  00110 1      OCTAL    110        JETS  6 13  0  0 NO 2  CTR 0
0177                 25,2471  01510 1      OCTAL   1510        JETS  6 13  0  0 NO 2  CTR 3
0178                 25,2472  04144 1      OCTAL   4144        JETS  5 10 13  0 NO 1  CTR 0
0179                 25,2473  04105 1      OCTAL   4105        JETS  1  5 13  0 NO 1  CTR 0
0180                 25,2474  04401 0      OCTAL   4401        JETS  1  0  0  0 NO 1  CTR 1
0181                 25,2475  00041 1      OCTAL     41        JETS  1 10  0  0 NO 2  CTR 0
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0182                  25,2476   01441 1        OCTAL     1441        JETS  1 10  0  0 NO 2   CTR 3
0183                  25,2477   04106 1        OCTAL     4106        JETS  2  5 13  0 NO 1   CTR 0
0184                  25,2500   04124 1        OCTAL     4124        JETS  5  9 13  0 NO 1   CTR 0
0185                  25,2501   04420 0        OCTAL     4420        JETS  9  0  0  0 NO 1   CTR 1
0186                  25,2502   00022 1        OCTAL       22        JETS  2  9  0  0 NO 2   CTR 0
0187                  25,2503   01422 1        OCTAL     1422        JETS  2  9  0  0 NO 2   CTR 3
0188                  25,2504   04004 1        OCTAL     4004        JETS  5  0  0  0 NO 1   CTR 0
0189                  25,2505   04200 1        OCTAL     4200        JETS 14  0  0  0 NO 1   CTR 0
0190                  25,2506   00604 0        OCTAL      604        JETS  5 14  0  0 NO 2   CTR 1
0191                  25,2507   04001 1        OCTAL     4001        JETS  1  0  0  0 NO 1   CTR 0
0192                  25,2510   04040 1        OCTAL     4040        JETS 10  0  0  0 NO 1   CTR 0
0193                  25,2511   00441 0        OCTAL      441        JETS  1 10  0  0 NO 2   CTR 1
0194                  25,2512   04100 1        OCTAL     4100        JETS 13  0  0  0 NO 1   CTR 0
0195                  25,2513   04010 1        OCTAL     4010        JETS  6  0  0  0 NO 1   CTR 0
0196                  25,2514   00510 0        OCTAL      510        JETS  6 13  0  0 NO 2   CTR 1
0197                  25,2515   04020 1        OCTAL     4020        JETS  9  0  0  0 NO 1   CTR 0
0198                  25,2516   04002 1        OCTAL     4002        JETS  2  0  0  0 NO 1   CTR 0
0199                  25,2517   00422 0        OCTAL      422        JETS  2  9  0  0 NO 2   CTR 1
0200                  25,2520   00024 1        OCTAL       24        JETS  5  9  0  0 NO 2   CTR 0
0201                  25,2521   00220 1        OCTAL      220        JETS  9 14  0  0 NO 2   CTR 0
0202                  25,2522   00006 1        OCTAL        6        JETS  2  5  0  0 NO 2   CTR 0
0203                  25,2523   01202 0        OCTAL     1202        JETS  2 14  0  0 NO 2   CTR 2
0204                  25,2524   00005 1        OCTAL        5        JETS  1  5  0  0 NO 2   CTR 0
0205                  25,2525   00201 1        OCTAL      201        JETS  1 14  0  0 NO 2   CTR 0
0206                  25,2526   00044 1        OCTAL       44        JETS  5 10  0  0 NO 2   CTR 0
0207                  25,2527   01240 0        OCTAL     1240        JETS 10 14  0  0 NO 2   CTR 2
0208                  25,2530   00101 1        OCTAL      101        JETS  1 13  0  0 NO 2   CTR 0
0209                  25,2531   00140 1        OCTAL      140        JETS 10 13  0  0 NO 2   CTR 0
0210                  25,2532   00011 1        OCTAL       11        JETS  1  6  0  0 NO 2   CTR 0
0211                  25,2533   01050 0        OCTAL     1050        JETS  6 10  0  0 NO 2   CTR 2
0212                  25,2534   00120 1        OCTAL      120        JETS  9 13  0  0 NO 2   CTR 0
0213                  25,2535   00102 1        OCTAL      102        JETS  2 13  0  0 NO 2   CTR 0
0214                  25,2536   00030 1        OCTAL       30        JETS  6  9  0  0 NO 2   CTR 0
0215                  25,2537   01012 0        OCTAL     1012        JETS  2  6  0  0 NO 2   CTR 2
0216                  25,2540   00024 1        OCTAL       24        JETS  5  9  0  0 NO 2   CTR 0
0217                  25,2541   00202 1        OCTAL      202        JETS  2 14  0  0 NO 2   CTR 0
0218                  25,2542   00220 1        OCTAL      220        JETS  9 14  0  0 NO 2   CTR 0
0219                  25,2543   01006 0        OCTAL     1006        JETS  2  5  0  0 NO 2   CTR 2
0220                  25,2544   11626 0        OCTAL    11626        JETS  2  5  9 14 NO 4   CTR 3
0221                  25,2545   00005 1        OCTAL        5        JETS  1  5  0  0 NO 2   CTR 0
0222                  25,2546   00240 1        OCTAL      240        JETS 10 14  0  0 NO 2   CTR 0
0223                  25,2547   00201 1        OCTAL      201        JETS  1 14  0  0 NO 2   CTR 0
0224                  25,2550   01044 0        OCTAL     1044        JETS  5 10  0  0 NO 2   CTR 2
0225                  25,2551   11645 0        OCTAL    11645        JETS  1  5 10 14 NO 4   CTR 3
0226                  25,2552   00050 1        OCTAL       50        JETS  6 10  0  0 NO 2   CTR 0
0227                  25,2553   00101 1        OCTAL      101        JETS  1 13  0  0 NO 2   CTR 0
0228                  25,2554   00140 1        OCTAL      140        JETS 10 13  0  0 NO 2   CTR 0
0229                  25,2555   01011 0        OCTAL     1011        JETS  1  6  0  0 NO 2   CTR 2
0230                  25,2556   11551 0        OCTAL    11551        JETS  1  6 10 13 NO 4   CTR 3
0231                  25,2557   00120 1        OCTAL      120        JETS  9 13  0  0 NO 2   CTR 0
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L       JET FAILURE CONTROL LOGIC                                                     USER'S OWN PAGE NO.   6

 0232                          25,2560   00012 1            OCTAL      12             JETS  2  6   0   0 NO 2   CTR 0
 0233                          25,2561   00102 1            OCTAL     102             JETS  2 13   0   0 NO 2   CTR 0
 0234                          25,2562   01030 0            OCTAL    1030             JETS  6  9   0   0 NO 2   CTR 2
 0235                          25,2563   11532 0            OCTAL   11532             JETS  2  6   9  13 NO 4   CTR 3

R0236   POLTAB2 LISTS Q,R-AXIS TRANSLATIONAL POLICIES

 0237                          25,2564   25610 1  POLTAB2   OCTAL   25610             JETS  6 14   QNO  2   RNO  0
 0238                          25,2565   25442 1            OCTAL   25442             JETS  2 10   QNO  2   RNO  0
 0239                          25,2566   25400 1            OCTAL   25400             JETS  0  0   QNO  2   RNO  0
 0240                          25,2567   31610 1            OCTAL   31610             JETS  6 14   QNO  4   RNO  0
 0241                          25,2570   31442 1            OCTAL   31442             JETS  2 10   QNO  4   RNO  0
 0242                          25,2571   16610 1            OCTAL   16610             JETS  6 14   QNO  0   RNO  2
 0243                          25,2572   16442 1            OCTAL   16442             JETS  2 10   QNO  0   RNO  2
 0244                          25,2573   16400 1            OCTAL   16400             JETS  0  0   QNO  0   RNO  2
 0245                          25,2574   17210 1            OCTAL   17210             JETS  6 14   QNO  0   RNO  4
 0246                          25,2575   17042 1            OCTAL   17042             JETS  2 10   QNO  0   RNO  4
 0247                          25,2576   05442 0            OCTAL    5442             JETS  2 10   QNO- 2   RNO  0
 0248                          25,2577   05610 0            OCTAL    5610             JETS  6 14   QNO- 2   RNO  0
 0249                          25,2600   05400 0            OCTAL    5400             JETS  0  0   QNO- 2   RNO  0
 0250                          25,2601   01610 1            OCTAL    1610             JETS  6 14   QNO- 4   RNO  0
 0251                          25,2602   01442 1            OCTAL    1442             JETS  2 10   QNO- 4   RNO  0
 0252                          25,2603   14442 0            OCTAL   14442             JETS  2 10   QNO  0   RNO- 2
 0253                          25,2604   14610 0            OCTAL   14610             JETS  6 14   QNO  0   RNO- 2
 0254                          25,2605   14400 0            OCTAL   14400             JETS  0  0   QNO  0   RNO- 2
 0255                          25,2606   14210 1            OCTAL   14210             JETS  6 14   QNO  0   RNO- 4
 0256                          25,2607   14042 1            OCTAL   14042             JETS  2 10   QNO  0   RNO- 4
 0257                          25,2610   25421 1            OCTAL   25421             JETS  1  9   QNO  2   RNO  0
 0258                          25,2611   25504 1            OCTAL   25504             JETS  5 13   QNO  2   RNO  0
 0259                          25,2612   25400 1            OCTAL   25400             JETS  0  0   QNO  2   RNO  0
 0260                          25,2613   31504 1            OCTAL   31504             JETS  5 13   QNO  4   RNO  0
 0261                          25,2614   31421 1            OCTAL   31421             JETS  1  9   QNO  4   RNO  0
 0262                          25,2615   16504 1            OCTAL   16504             JETS  5 13   QNO  0   RNO  2
 0263                          25,2616   16421 1            OCTAL   16421             JETS  1  9   QNO  0   RNO  2
 0264                          25,2617   16400 1            OCTAL   16400             JETS  0  0   QNO  0   RNO  2
 0265                          25,2620   17104 1            OCTAL   17104             JETS  5 13   QNO  0   RNO  4
 0266                          25,2621   17021 1            OCTAL   17021             JETS  1  9   QNO  0   RNO  4
 0267                          25,2622   05504 0            OCTAL    5504             JETS  5 13   QNO- 2   RNO  0
 0268                          25,2623   05421 0            OCTAL    5421             JETS  1  9   QNO- 2   RNO  0
 0269                          25,2624   05400 0            OCTAL    5400             JETS  0  0   QNO- 2   RNO  0
 0270                          25,2625   01504 1            OCTAL    1504             JETS  5 13   QNO- 4   RNO  0
 0271                          25,2626   01421 1            OCTAL    1421             JETS  1  9   QNO- 4   RNO  0
 0272                          25,2627   14421 0            OCTAL   14421             JETS  1  9   QNO  0   RNO- 2
 0273                          25,2630   14504 0            OCTAL   14504             JETS  5 13   QNO  0   RNO- 2
 0274                          25,2631   14400 0            OCTAL   14400             JETS  0  0   QNO  0   RNO- 2
 0275                          25,2632   14104 1            OCTAL   14104             JETS  5 13   QNO  0   RNO- 4
 0276                          25,2633   14021 1            OCTAL   14021             JETS  1  9   QNO  0   RNO- 4
 0277                          25,2634   22042 1            OCTAL   22042             JETS  2 10   QNO  1   RNO  1
 0278                          25,2635   22042 1            OCTAL   22042             JETS  2 10   QNO  1   RNO  1
 0279                          25,2636   22210 1            OCTAL   22210             JETS  6 14   QNO  1   RNO  1
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0280                25,2637   26610 1        OCTAL   26610         JETS  6 14   QNO   2   RNO   2
0281                25,2640   26442 1        OCTAL   26442         JETS  2 10   QNO   2   RNO   2
0282                25,2641   11042 1        OCTAL   11042         JETS  2 10   QNO-  1   RNO-  1
0283                25,2642   11042 1        OCTAL   11042         JETS  2 10   QNO-  1   RNO-  1
0284                25,2643   11210 1        OCTAL   11210         JETS  6 14   QNO-  1   RNO-  1
0285                25,2644   04610 1        OCTAL    4610         JETS  6 14   QNO-  2   RNO-  2
0286                25,2645   04442 1        OCTAL    4442         JETS  2 10   QNO-  2   RNO-  2
0287                25,2646   12210 1        OCTAL   12210         JETS  6 14   QNO-  1   RNO   1
0288                25,2647   12210 1        OCTAL   12210         JETS  6 14   QNO-  1   RNO   1
0289                25,2650   12042 1        OCTAL   12042         JETS  2 10   QNO-  1   RNO   1
0290                25,2651   06442 0        OCTAL    6442         JETS  2 10   QNO-  2   RNO   2
0291                25,2652   06610 0        OCTAL    6610         JETS  6 14   QNO-  2   RNO   2
0292                25,2653   21210 1        OCTAL   21210         JETS  6 14   QNO   1   RNO-  1
0293                25,2654   21210 1        OCTAL   21210         JETS  6 14   QNO   1   RNO-  1
0294                25,2655   21042 1        OCTAL   21042         JETS  2 10   QNO   1   RNO-  1
0295                25,2656   24442 0        OCTAL   24442         JETS  2 10   QNO   2   RNO-  2
0296                25,2657   24610 0        OCTAL   24610         JETS  6 14   QNO   2   RNO-  2
0297                25,2660   22021 1        OCTAL   22021         JETS  1  9   QNO   1   RNO   1
0298                25,2661   22021 1        OCTAL   22021         JETS  1  9   QNO   1   RNO   1
0299                25,2662   22104 1        OCTAL   22104         JETS  5 13   QNO   1   RNO   1
0300                25,2663   26504 1        OCTAL   26504         JETS  5 13   QNO   2   RNO   2
0301                25,2664   26421 1        OCTAL   26421         JETS  1  9   QNO   2   RNO   2
0302                25,2665   11021 1        OCTAL   11021         JETS  1  9   QNO-  1   RNO-  1
0303                25,2666   11021 1        OCTAL   11021         JETS  1  9   QNO-  1   RNO-  1
0304                25,2667   11104 1        OCTAL   11104         JETS  5 13   QNO-  1   RNO-  1
0305                25,2670   04504 1        OCTAL    4504         JETS  5 13   QNO-  2   RNO-  2
0306                25,2671   04421 1        OCTAL    4421         JETS  1  9   QNO-  2   RNO-  2
0307                25,2672   12104 1        OCTAL   12104         JETS  5 13   QNO-  1   RNO   1
0308                25,2673   12104 1        OCTAL   12104         JETS  5 13   QNO-  1   RNO   1
0309                25,2674   12021 1        OCTAL   12021         JETS  1  9   QNO-  1   RNO   1
0310                25,2675   06421 0        OCTAL    6421         JETS  1  9   QNO-  2   RNO   2
0311                25,2676   06504 0        OCTAL    6504         JETS  5 13   QNO-  2   RNO   2
0312                25,2677   21104 1        OCTAL   21104         JETS  5 13   QNO   1   RNO-  1
0313                25,2700   21104 1        OCTAL   21104         JETS  5 13   QNO   1   RNO-  1
0314                25,2701   21021 1        OCTAL   21021         JETS  1  9   QNO   1   RNO-  1
0315                25,2702   24421 0        OCTAL   24421         JETS  1  9   QNO   2   RNO-  2
0316                25,2703   24504 0        OCTAL   24504         JETS  5 13   QNO   2   RNO-  2
0317                25,2704   22000 1        OCTAL   22000         JETS  0  0   QNO   1   RNO   1
0318                25,2705   22000 1        OCTAL   22000         JETS  0  0   QNO   1   RNO   1
0319                25,2706   26400 1        OCTAL   26400         JETS  0  0   QNO   2   RNO   2
0320                25,2707   12000 1        OCTAL   12000         JETS  0  0   QNO-  1   RNO   1
0321                25,2710   12000 1        OCTAL   12000         JETS  0  0   QNO-  1   RNO   1
0322                25,2711   06400 0        OCTAL    6400         JETS  0  0   QNO-  2   RNO   2
0323                25,2712   11000 1        OCTAL   11000         JETS  0  0   QNO-  1   RNO-  1
0324                25,2713   11000 1        OCTAL   11000         JETS  0  0   QNO-  1   RNO-  1
0325                25,2714   04400 1        OCTAL    4400         JETS  0  0   QNO-  2   RNO-  2
0326                25,2715   21000 1        OCTAL   21000         JETS  0  0   QNO   1   RNO-  1
0327                25,2716   21000 1        OCTAL   21000         JETS  0  0   QNO   1   RNO-  1
0328                25,2717   24400 0        OCTAL   24400         JETS  0  0   QNO   2   RNO-  2
0329                25,2720   25400 1        OCTAL   25400         JETS  0  0   QNO   2   RNO   0
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0330                   25,2721   25400 1          OCTAL  25400        JETS  0  0  QNO   2  RNO   0
0331                   25,2722   25400 1          OCTAL  25400        JETS  0  0  QNO   2  RNO   0
0332                   25,2723   25400 1          OCTAL  25400        JETS  0  0  QNO   2  RNO   0
0333                   25,2724   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0334                   25,2725   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0335                   25,2726   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0336                   25,2727   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0337                   25,2730   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0338                   25,2731   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0339                   25,2732   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0340                   25,2733   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0341                   25,2734   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0342                   25,2735   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0343                   25,2736   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0344                   25,2737   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0345                   25,2740   25400 1          OCTAL  25400        JETS  0  0  QNO   2  RNO   0
0346                   25,2741   25400 1          OCTAL  25400        JETS  0  0  QNO   2  RNO   0
0347                   25,2742   25400 1          OCTAL  25400        JETS  0  0  QNO   2  RNO   0
0348                   25,2743   25400 1          OCTAL  25400        JETS  0  0  QNO   2  RNO   0
0349                   25,2744   31400 1          OCTAL  31400        JETS  0  0  QNO   4  RNO   0
0350                   25,2745   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0351                   25,2746   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0352                   25,2747   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0353                   25,2750   16400 1          OCTAL  16400        JETS  0  0  QNO   0  RNO   2
0354                   25,2751   17000 1          OCTAL  17000        JETS  0  0  QNO   0  RNO   4
0355                   25,2752   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0356                   25,2753   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0357                   25,2754   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0358                   25,2755   05400 0          OCTAL   5400        JETS  0  0  QNO-  2  RNO   0
0359                   25,2756   01400 1          OCTAL   1400        JETS  0  0  QNO-  4  RNO   0
0360                   25,2757   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0361                   25,2760   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0362                   25,2761   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0363                   25,2762   14400 0          OCTAL  14400        JETS  0  0  QNO   0  RNO-  2
0364                   25,2763   14000 1          OCTAL  14000        JETS  0  0  QNO   0  RNO-  4


R0365   NORMLPOL LISTS THE ENTRY POINTS OF NORMAL POLICIES

0366                   25,2764   00177 0          DEC    127
0367                   25,2765   00176 1          DEC    126
0368                   25,2766   00130 0          DEC    88
0369                   25,2767   00130 0          DEC    88
0370                   25,2770   00172 0          DEC    122
0371                   25,2771   00171 0          DEC    121
0372                   25,2772   00125 1          DEC    85
0373                   25,2773   00125 1 NORMLPOL DEC    85
0374                   25,2774   00133 0          DEC    91
0375                   25,2775   00133 0          DEC    91
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 0376                          25,2776   00122 0             DEC       82
 0377                          25,2777   00122 0             DEC       82
 0378                          25,3000   00165 0             DEC       117
 0379                          25,3001   00164 1             DEC       116
 0380                          25,3002   00160 0             DEC       112
 0381                          25,3003   00157 1             DEC       111

R0382    ASCNTPOL LISTS THE ENTRY POINTS UNDER ASCENT CONDITIONS

 0383                          25,3004   00177 0             DEC       127
 0384                          25,3005   00153 0             DEC       107
 0385                          25,3006   00130 0             DEC       88
 0386                          25,3007   00130 0             DEC       88
 0387                          25,3010   00172 0             DEC       122
 0388                          25,3011   00147 0             DEC       103
 0389                          25,3012   00125 1             DEC       85
 0390                          25,3013   00125 1   ASCNTPOL  DEC       85
 0391                          25,3014   00133 0             DEC       91
 0392                          25,3015   00133 0             DEC       91
 0393                          25,3016   00122 0             DEC       82
 0394                          25,3017   00122 0             DEC       82
 0395                          25,3020   00165 0             DEC       117
 0396                          25,3021   00143 1             DEC       99
 0397                          25,3022   00160 0             DEC       112
 0398                          25,3023   00137 1             DEC       95

R0399    +XPOLADR LISTS THE ENTRY POINTS UNDER +X TRANSLATION CONDITIONS

 0400                          25,3024   00023 0             DEC       19
 0401                          25,3025   00021 1             DEC       17
 0402                          25,3026   00061 0             DEC       49
 0403                          25,3027   00057 0             DEC       47
 0404                          25,3030   00016 0             DEC       14
 0405                          25,3031   00014 1             DEC       12
 0406                          25,3032   00066 1             DEC       54
 0407                          25,3033   00064 0   +XPOLADR  DEC       52
 0408                          25,3034   00073 0             DEC       59
 0409                          25,3035   00071 1             DEC       57
 0410                          25,3036   00054 0             DEC       44
 0411                          25,3037   00052 0             DEC       42
 0412                          25,3040   00011 1             DEC       9
 0413                          25,3041   00007 0             DEC       7
 0414                          25,3042   00004 0             DEC       4
 0415                          25,3043   00002 0             DEC       2

R0416    -XPOLADR LISTS THE ENTRY POINTS UNDER -X TRANSLATION CONDITIONS

 0417                          25,3044   00047 1             DEC       39
 0418                          25,3045   00045 0             DEC       37
 0419                          25,3046   00105 0             DEC       69
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0420                    25,3047   00103 0              DEC     67
0421                    25,3050   00042 1              DEC     34
0422                    25,3051   00040 0              DEC     32
0423                    25,3052   00112 0              DEC     74
0424                    25,3053   00110 1   -XPOLADR   DEC     72
0425                    25,3054   00117 0              DEC     79
0426                    25,3055   00115 1              DEC     77
0427                    25,3056   00100 0              DEC     64
0428                    25,3057   00076 0              DEC     62
0429                    25,3060   00035 1              DEC     29
0430                    25,3061   00033 1              DEC     27
0431                    25,3062   00030 1              DEC     24
0432                    25,3063   00026 0              DEC     22
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L       @KALMAN FILTER FOR LEM DAP                                                  USER'S OWN PAGE NO.   1

R0001   THE FOLLOWING T5RUPT ENTRY BEGINS THE PROGRAM WHICH INITIALIZES THE KALMAN FILTER AND SETS UP A P-AXIS RUPT TO
R0003   OCCUR 20 MS FROM ITS BEGINNING.

 0004                              26,2000            BANK     26

 0005   REF   1           26,2000  3 2372 0  FILTINIT CAF      MS20F           RESET TIMER IMMEDIATELY: DT = 20 MS
 0006   REF   6 LAST 562  26,2001  54 030 0           TS       TIME5

 0007   REF  13 LAST 562  26,2002  22 016 0           LXCH     BANKRUPT        INTERRUPT LEAD IN (CONTINUED)
 0008                     26,2003  0 0006 1           EXTEND
 0009   REF  12 LAST 562  26,2004  22 012 1           QXCH     QRUPT

 0010                     26,2005  0 0006 1           EXTEND                   SET UP FOR P-AXIS RUPT
 0011   REF   1           26,2006  3 2071 0           DCA      PAX/FILT
 0012   REF  10 LAST 574  26,2007  52 346 1           DXCH     T5ADR

 0013   REF   1           26,2010  3 2013 1           CAF      FIRSTADR        SET UP TO AVOID DT CALCULATION DURING
 0014   REF   1           26,2011  55'553 1           TS       STEERADR        KALMAN FILTER INITIALIZATION PASS

 0015   *         DELETE THROUGH 0016
 0017   REF   1           26,2012  1 2032 0           TCF      FILSTART

 0018   *         DELETE
 0019   REF   1           26,2013   02315 1  FIRSTADR GENADR   FILFIRST

R0020   THE FOLLOWING T5RUPT ENTRY BEGINS THE KALMAN FILTER PROGRAM.  THIS SECTION ALSO SETS UP A T5RUPT TO OCCUR 20 MS
R0022   FROM ITS BEGINNING AND SETS IT TO GO TO THE LOCATION AT THE TOP OF THE POST FILTER RUPT LIST.

 0024   REF   1           26,2014   02051 1  MOSTPASS GENADR   DTCALC          WORD IN FILTPASS FOR THESE PASSES

 0025   REF   2 LAST 604  26,2015  3 2372 0  FILTER   CAF      MS20F           RESET TIMER IMMEDIATELY: DT = 20 MS
 0026   REF   7 LAST 604  26,2016  54 030 0           TS       TIME5

 0027   REF  14 LAST 604  26,2017  22 016 0           LXCH     BANKRUPT        INTERRUPT LEAD IN (CONTINUED)
 0028                     26,2020  0 0006 1           EXTEND
 0029   REF  13 LAST 604  26,2021  22 012 1           QXCH     QRUPT

 0030                     26,2022  0 0006 1           EXTEND                   SET RUPT ADDRESS TO TOP OF
 0031   REF   1           26,2023  3 1604 1           DCA      PFRPTLST        POST FILTER RUPT LIST
 0032   REF  11 LAST 604  26,2024  52 346 1           DXCH     T5ADR

 0033   REF   2 LAST 604  26,2025  53'604 0           DXCH     PFRPTLST        ROTATE 2CADR'S IN POST FILTER RUPT LIST
 0034   REF   3 LAST 604  26,2026  53'612 1           DXCH     PFRPTLST +6
 0035   REF   4 LAST 604  26,2027  53'610 0           DXCH     PFRPTLST +4
 0036   REF   5 LAST 604  26,2030  53'606 1           DXCH     PFRPTLST +2
 0037   REF   6 LAST 604  26,2031  53'604 0           DXCH     PFRPTLST

R0038   BEGIN THE KALMAN FILTER BY READING CDU ANGLES AND TIME.

 0039   REF   9 LAST 590  26,2032  0 4177 1  FILSTART TC       T6JOBCHK        CHECK T6 CLOCK FOR P-AXIS ACTIVITY
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L       @KALMAN FILTER FOR LEM DAP                                                  USER'S OWN PAGE NO.   2

 0040                           26,2033   0 0006 1                 EXTEND
 0041    REF  17 LAST 576       26,2034   3 0034 0                 DCA      CDUY          STORE CDUY AND CDUZ AT PI AND IN 2,S COM
 0042    REF   1                26,2035   53'550 1                 DXCH     STORCDUY
 0043                           26,2036   0 0006 1                 EXTEND                 BEGIN READING THE CLOCK TO GET TIME
 0044                           26,2037   00 004 0                 READ     4               INCREMENT.
 0045    REF 208 LAST 596       26,2040   54 001 1                 TS       L
 0046                           26,2041   0 0006 1                 EXTEND
 0047                           26,2042   06 004 0                 RXOR     4             CHECK TO SEE IF CH 4 WAS IN TRANSITION
 0048                           26,2043   0 0006 1                 EXTEND                   WHEN IT WAS FIRST READ.
 0049                           26,2044   1 2050 1                 BZF      +4            BRANCH IF TIME WAS THE SAME IN 2 READS.
 0050                           26,2045   0 0006 1                 EXTEND
 0051                           26,2046   00 004 0                 READ     4
 0052    REF 209 LAST 605       26,2047   54 001 1                 TS       L             THIS TIME READ ALWAYS GIVES GOOD NO.
 0053    REF   2 LAST 604       26,2050   0 1553 0                 TC       STEERADR      SKIP DTCALC DURING INITIAL PASS

 0054    REF 210 LAST 605       26,2051   4 0001 1   DTCALC        CS       L
 0055    REF   1                26,2052   6 1552 1                 AD       DAPTIME       A CONTAINS THE TIME DIFFERENCE (DT)
 0056    REF   2 LAST 605       26,2053   23'552 1                 LXCH     DAPTIME         SINCE THE LAST FILTER.
 0057                           26,2054   0 0006 1                 EXTEND
 0058                           26,2055   6 2060 0                 BZMF     +3
 0059    REF   5 LAST 182       26,2056   6 7640 1                 AD       NEG1/2        THIS IS ADDING -1.0 TO -DT AND ACCOUNTS
 0060    REF   6 LAST 605       26,2057   6 7640 1                 AD       NEG1/2        FOR AN OVERFLOW INTO CHANNEL 5

R0061    SCALING OF DELTA T FOR KALMAN FILTER IS 1/8 SECOND.

 0062                           26,2060   0 0006 1                 EXTEND                 TIME NOW SCALED AT 5.12 SECONDS
 0063    REF  35 LAST 594       26,2061   7 7651 0                 MP       BIT7          FIRST RESCALE TO 5.12/64
 0064    REF   1                26,2062   4 2367 0                 CS       .64
 0065                           26,2063   0 0006 1                 EXTEND                 THEN RESCALE TO 5.12/(64*.64) OR
 0066    REF 211 LAST 605       26,2064   7 0001 1                 MP       L             5.12/40.96 WHICH IS THE SAME AS
 0067    REF   6 LAST 594       26,2065   55'551 0                 TS       DT            DT SCALED AT 1/8

R0068    SET UP FILTER WEIGHTING VECTOR FOR THIS FILTER PASS.

 0069    REF   1                26,2066   11'556 1                 CCS      WPOINTER      TEST FOR WEIGHTING VECTOR STEADY-STATE
 0070    REF   1                26,2067   1 2073 0                 TCF      MOVEWGTS      POINTER NOT YET ZERO (MULTIPLE OF THREE)
 0071                           26,2070    02055 0   PAX/FILT      2CADR    PAXIS         (ROOM FOR 2CADR IN CCS HOLES)
C0071    REF   2 LAST 560       26,2071    46006 0
 0072    REF   1                26,2072   1 2104 1                 TCF      FLTZAXIS      STEADY-STATE ALREADY, NO UPDATING AGAIN

 0073    REF  26 LAST 582       26,2073   4 6165 1   MOVEWGTS      CS       THREE         SET UP POINTER FOR THIS PASS
 0074    REF   2 LAST 605       26,2074   27'556 1                 ADS      WPOINTER      (NEVER GETS BELOW ZERO HERE)

 0075                           26,2075   0 0006 1                 EXTEND                 WPOINTER IS INDEX = 87 FIRST TIME HERE
 0076    REF   3 LAST 605       26,2076   5 1556 0                 INDEX    WPOINTER      AND IS DECREASED BY 3 EVERY FILTER PASS
 0077    REF   1                26,2077   3 2404 0                 DCA      WVECTOR       UNTIL THE STEADY-STATE IS REACHED.
 0078    REF   2 LAST 539       26,2100   53'560 1                 DXCH     W0            MOVE IN NEW W0,W1
 0079    REF   4 LAST 605       26,2101   51'556 0                 INDEX    WPOINTER
 0080    REF   2 LAST 605       26,2102   3 2405 1                 CAF      WVECTOR +2
 0081    REF   1                26,2103   55'561 0                 TS       W2            MOVE IN NEW W2
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L       @KALMAN FILTER FOR LEM DAP                                                 USER'S OWN PAGE NO.   3

 0082    REF  83 LAST 585       26,2104  3 7656 0  FLTZAXIS CAF     TWO              SET UP INDEXER FOR D.P. PICKUP AND TO
 0083    REF   9 LAST 578       26,2105  54 073 1           TS      QRCNTR           INDICATE Z-AXIS FILTER PASS

 0084    REF   1                26,2106  1 2112 0           TCF     FLTYAXIS

 0085    REF 222 LAST 586       26,2107  3 7665 0  GOYFILTR CAF     ZERO             SET INDEXER FOR Y-AXIS
 0086    REF  10 LAST 606       26,2110  54 073 1           TS      QRCNTR

 0087    REF  10 LAST 604       26,2111  0 4177 1           TC      T6JOBCHK         CHECK T6 CLOCK FOR P-AXIS ACTIVITY

 0088    REF  11 LAST 606       26,2112  50 073 0  FLTYAXIS INDEX   QRCNTR
 0089    REF   1                26,2113  53'563 1           DXCH    CDUYFIL          THETA IS D.P. SCALED AT 2 PI RADIANS
 0090    REF   1                26,2114  52 077 0           DXCH    CDU
 0091    REF  12 LAST 606       26,2115  50 073 0           INDEX   QRCNTR            .
 0092    REF   1                26,2116  53'567 0           DXCH    DCDUYFIL         THETA IS D.P. SCALED AT PI/4 RAD/SEC
 0093    REF   1                26,2117  52 066 0           DXCH    CDUDOT
 0094    REF  13 LAST 606       26,2120  50 073 0           INDEX   QRCNTR            ..                                  2
 0095    REF   1                26,2121  53'573 0           DXCH    D2CDUYFL         THETA IS D.P. SCALED AT PI/8 RAD/SEC
 0096    REF   1                26,2122  52 071 0           DXCH    CDU2DOT
 0097    REF  14 LAST 606       26,2123  50 073 0           INDEX   QRCNTR            ...                       7         3
 0098    REF   1                26,2124  31'576 1           CAE     Y3DOT            THETA IS S.P. SCALED AT PI/2 RAD/SEC
 0099    REF   1                26,2125  57'577 0           XCH     CDU3DOT

R0100    NOTE THAT THE FILTERED VARIABLES ARE READ DESTRUCTIVELY FOR SPEED AND EFFICIENCY AND THAT Y3DOT IS NOT UPDATED,
R0102    SO IT MUST BE READ NON-DESTRUCTIVELY BUT NEED NOT BE RESTORED AFTER EACH KALMAN FILTER PASS.
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L          @KALMAN FILTER FOR LEM DAP                                                      USER•S OWN PAGE NO.   4

P0104    INTEGRATION EXTRAPOLATION EQUATIONS:

 0105    REF    2 LAST 606     26,2126   30 070 0  KLMNFLTR CAE      CDU2DOT        A SCALED AT PI/8 (USE S.P.)
 0106                          26,2127   0 0006 1           EXTEND
 0107    REF    7 LAST 605     26,2130   7 1551 0           MP       DT             ADT SCALED AT PI/64 OR .5ADT AT PI/128
 0108                          26,2131   0 0006 1           EXTEND
 0109    REF   46 LAST 565     26,2132   7 7646 0           MP       BIT10          RESCALE BY RIGHT SHIFT 5
 0110    REF    2 LAST 606     26,2133   6 0065 1           AD       CDUDOT         W + .5ADT SCALED AT PI/4
 0111                          26,2134   0 0006 1           EXTEND
 0112    REF    8 LAST 607     26,2135   7 1551 0           MP       DT             (W + .5ADT)DT SCALED AT PI/32
 0113                          26,2136   0 0006 1           EXTEND
 0114    REF   24 LAST 596     26,2137   7 7647 1           MP       BIT9           RESCALE BY RIGHT SHIFT 6 (KEEP D.P.)
 0115    REF    2 LAST 606     26,2140   20 077 0           DAS      CDU            CDU = CDU + (W + .5ADT)DT SCALED AT 2PI

 0116    REF    2 LAST 606     26,2141   31'577 0           CAE      CDU3DOT        ADOT SCALED AT PI/2(7)
 0117                          26,2142   0 0006 1           EXTEND
 0118    REF    9 LAST 607     26,2143   7 1551 0           MP       DT             .5ADOTDT SCALED AT PI/2(11)
 0119    REF    3 LAST 538     26,2144   54 072 0           TS       ITEMP5         (SAVE FOR ALPHA INTEGRATION)
 0120                          26,2145   0 0006 1           EXTEND
 0121    REF   36 LAST 605     26,2146   7 7651 0           MP       BIT7           RESCALE BY RIGHT SHIFT 8
 0122    REF    3 LAST 607     26,2147   6 0070 0           AD       CDU2DOT        A + .5ADOTDT SCALED AT PI/8
 0123                          26,2150   0 0006 1           EXTEND
 0124    REF   10 LAST 607     26,2151   7 1551 0           MP       DT             (A + .5ADOTDT)DT SCALED AT PI/64
 0125                          26,2152   0 0006 1           EXTEND
 0126    REF   29 LAST 586     26,2153   7 7645 0           MP       BIT11          RESCALE BY RIGHT SHIFT 4 (KEEP D.P.)
 0127    REF    3 LAST 607     26,2154   20 066 0           DAS      CDUDOT         W = W + (A + .5ADOTDT)DT SCALED AT PI/4

 0128    REF    4 LAST 607     26,2155   30 072 1           CAE      ITEMP5         ADOTDT SCALED AT PI/2(10) (FROM ABOVE)
 0129                          26,2156   0 0006 1           EXTEND
 0130    REF   27 LAST 594     26,2157   7 7650 1           MP       BIT8           RESCALE BY RIGHT SHIFT 7 (KEEP D.P.)
 0131    REF    4 LAST 607     26,2160   20 071 0           DAS      CDU2DOT        A = A + ADOTDT SCALED AT PI/8
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P0132   WEIGHTING VECTOR ADJUSTMENT EQUATIONS:

 0133                          26,2161  0 0006 1          EXTEND                 CONVERT CDU INTEGRATED VALUE FROM DOUBLE
 0134   REF    3 LAST 607      26,2162  3 0077 1          DCA      CDU           PRECISION SCALED AT 2PI IN ONES COMPLE-
 0135   REF    1               26,2163  0 2302 1          TC       ONETOTWO      MENT TO SINGLE PRECISION SCALED AT PI
 0136   REF    1               26,2164  31'550 0          CAE      STORCDUZ      IN TWOS COMPLEMENT, THEN DIFFERENCE WITH
 0137                          26,2165  0 0006 1          EXTEND                 STORED CDU REGISTER READING TO GET A
 0138   REF    5 LAST 607      26,2166  20 072 0          MSU      ITEMP5        SINGLE PRECISION ONES COMPLEMENT RESULT
 0139   REF    1               26,2167  55'554 0          TS       DPDIFF        SCALED AT PI RADIANS (UPPER HALF)

 0140   REF    4 LAST 608      26,2170  4 0077 0          CS       CDU +1        CREATE LOW ORDER WORD OF D.P. DIFFERENCE
 0141                          26,2171  6 0000 1          DOUBLE                 ONES COMPLEMENT SCALED AT PI RADIANS AND
 0142   REF    2 LAST 608      26,2172  57'555 0          XCH      DPDIFF +1     USE S.P. RESULT ABOVE AS HIGH ORDER WORD

 0143                          26,2173  0 0006 1          EXTEND                 RESCALE DPDIFF TO PI
 0144   REF    3 LAST 608      26,2174  3 1555 0          DCA      DPDIFF
 0145                          26,2175  20 001 1          DDOUBL
 0146   REF    6 LAST 608      26,2176  22 072 1          LXCH     ITEMP5        SAVE LOW ORDER WORD FOR D.P. MULTIPLY
 0147                          26,2177  0 0006 1          EXTEND
 0148   REF    3 LAST 605      26,2200  7 1557 0          MP       WO            CDU = CDU + DPDIFF (D.P.) * WO (S.P.)
 0149   REF    5 LAST 608      26,2201  20 077 0          DAS      CDU
 0150   REF    7 LAST 608      26,2202  30 072 1          CAE      ITEMP5        WO IS SCALED AT 2
 0151                          26,2203  0 0006 1          EXTEND                 DPDIFF IS RESCALED TO PI
 0152   REF    4 LAST 608      26,2204  7 1557 0          MP       WO            WO*DPDIFF IS SCALED AT 2PI (AS CDU)
 0153   REF    6 LAST 608      26,2205  26 077 0          ADS      CDU +1
 0154   REF  212 LAST 605      26,2206  54 001 1          TS       L
 0155                          26,2207  1 2211 0          TCF       +2
 0156   REF    7 LAST 608      26,2210  26 076 1          ADS      CDU

 0157   REF    4 LAST 608      26,2211  31'554 1          CAE      DPDIFF        RESCALE DPDIFF TO PI/128
 0158                          26,2212  0 0006 1          EXTEND
 0159   REF   25 LAST 607      26,2213  7 7647 1          MP       BIT9          DPDIFF (D.P.) * 256
 0160   REF    8 LAST 608      26,2214  22 072 1          LXCH     ITEMP5
 0161   REF    5 LAST 608      26,2215  31'555 0          CAE      DPDIFF +1
 0162                          26,2216  0 0006 1          EXTEND
 0163   REF   26 LAST 608      26,2217  7 7647 1          MP       BIT9
 0164   REF    9 LAST 608      26,2220  6 0072 1          AD       ITEMP5
 0165   REF   10 LAST 608      26,2221  22 072 1          LXCH     ITEMP5

                                                                                  .       .
 0166                          26,2222  0 0006 1          EXTEND
 0167   REF    2 LAST 539      26,2223  7 1560 1          MP       W1            CDU = CDU + DPDIFF (D.P.) * W1 (S.P.)
 0168   REF    4 LAST 607      26,2224  20 066 0          DAS      CDUDOT
 0169   REF   11 LAST 608      26,2225  30 072 1          CAE      ITEMP5        W1 IS SCALED AT 32
 0170                          26,2226  0 0006 1          EXTEND                 DPDIFF IS RESCALED TO PI/128
 0171   REF    3 LAST 608      26,2227  7 1560 1          MP       W1            W1*DPDIFF IS SCALED AT PI/4 (AS CDUDOT)
 0172   REF    5 LAST 608      26,2230  26 066 0          ADS      CDUDOT +1
 0173   REF  213 LAST 608      26,2231  54 001 1          TS       L
 0174                          26,2232  1 2234 1          TCF       +2
 0175   REF    6 LAST 608      26,2233  26 065 0          ADS      CDUDOT
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L       @KALMAN FILTER FOR LEM DAP                                                     USER'S OWN PAGE NO.   6

 0176   REF   6 LAST 608    26,2234  31'554 1           CAE      DPDIFF          RESCALE DPDIFF TO PI/64
 0177                       26,2235  0 0006 1           EXTEND
 0178   REF  28 LAST 607    26,2236  7 7650 1           MP       BIT8            DPDIFF (D.P.) * 128
 0179   REF  12 LAST 608    26,2237  22 072 1           LXCH     ITEMP5
 0180   REF   7 LAST 609    26,2240  31'555 0           CAE      DPDIFF +1
 0181                       26,2241  0 0006 1           EXTEND
 0182   REF  29 LAST 609    26,2242  7 7650 1           MP       BIT8
 0183   REF  13 LAST 609    26,2243  6 0072 1           AD       ITEMP5
 0184   REF  14 LAST 609    26,2244  22 072 1           LXCH     ITEMP5

 0185                       26,2245  0 0006 1           EXTEND                    ..      ..
 0186   REF   2 LAST 605    26,2246  7 1561 0           MP       W2              CDU = CDU + DPDIFF (D.P.) * W2 (S.P.)
 0187   REF   5 LAST 607    26,2247  20 071 0           DAS      CDU2DOT
 0188   REF  15 LAST 609    26,2250  30 072 1           CAE      ITEMP5          W2 IS SCALED AT 8
 0189                       26,2251  0 0006 1           EXTEND
 0190   REF   3 LAST 609    26,2252  7 1561 0           MP       W2              W2*DPDIFF IS SCALED AT PI/8 (AS CDU2DOT)
 0191   REF   6 LAST 609    26,2253  26 071 0           ADS      CDU2DOT +1
 0192   REF 214 LAST 608    26,2254  54 001 1           TS       L
 0193                       26,2255  1 2257 1           TCF       +2
 0194   REF   7 LAST 609    26,2256  26 070 1           ADS      CDU2DOT

R0195   RESTORE VARIABLES AND TEST FOR COMPLETION OR ADDITIONAL AXIS.

 0196   REF   8 LAST 608    26,2257  52 077 0  FILTAXIS DXCH     CDU
 0197   REF  15 LAST 606    26,2260  50 073 0           INDEX    QRCNTR          THETA IS D.P. SCALED AT 2 PI RADIANS
 0198   REF   2 LAST 606    26,2261  53'563 1           DXCH     CDUYFIL
 0199   REF   7 LAST 608    26,2262  52 066 0           DXCH     CDUDOT           .
 0200   REF  16 LAST 609    26,2263  50 073 0           INDEX    QRCNTR          THETA IS D.P. SCALED AT PI/4 RAD/SEC
 0201   REF   2 LAST 606    26,2264  53'567 0           DXCH     DCDUYFIL
 0202   REF   8 LAST 609    26,2265  52 071 0           DXCH     CDU2DOT          ..                                     2
 0203   REF  17 LAST 609    26,2266  50 073 0           INDEX    QRCNTR          THETA IS D.P. SCALED AT PI/8 RAD/SEC
 0204   REF   2 LAST 606    26,2267  53'573 0           DXCH     D2CDUYFL

 0205   REF   2 LAST 605    26,2270  57'547 0           XCH      STORCDUY        INTERCHANGE CDU READINGS
 0206   REF   2 LAST 608    26,2271  57'550 0           XCH      STORCDUZ
 0207   REF   3 LAST 609    26,2272  57'547 0           XCH      STORCDUY

 0208   REF   2 LAST 538    26,2273  10 073 1           CCS      ITEMP6          ITEMP6 IS AXIS INDEXER
 0209   REF   1             26,2274  1 2107 1           TCF      GOYFILTR        IF 2, Y-AXIS STILL TO GO

 0210   REF  12 LAST 604    26,2275  4 0345 1           CS       T5ADR           IF THE TRIM GIMBAL CONTROL RUPT IS NEXT,
 0211   REF   1             26,2276  6 2377 0           AD       GTS2CADR        DO THE Q,R-AXIS STATE TRANSFORMATIONS
 0212                       26,2277  0 0006 1           EXTEND                   AND THE 20 MS STATE EXTRAPOLATION
 0213   REF   1             26,2300  1 2575 0           BZF      GIMBAL
 0214   REF  35 LAST 575    26,2301  1 4606 1           TCF      RESUME          OTHERWISE, RESUME

R0215   SJBROUTINE FOR FILTER WHICH TAKES 1 COMPLEMENT NUMBER INTO A 2 COMP.

 0216                       26,2302  20 001 1  ONETOTWO DDOUBL                   SEE RTB OP CODES IN BANK 15 FOR NOTES ON
 0217   REF 365 LAST 595    26,2303  10 000 0           CCS      A                 THIS COMPUTATION.
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0218  REF 156 LAST 582   26,2304  6 7657 1             AD      ONE
0219                     26,2305  1 2307 0             TCF     +2
0220                     26,2306  4 0000 0             COM
0221  REF  16 LAST 609   26,2307  54 072 0             TS      ITEMP5
0222                     26,2310  1 2314 1             TCF     +4
0223  REF 366 LAST 609   26,2311  50 000 1             INDEX   A
0224  REF   5 LAST 428   26,2312  3 7640 1             CAF     LIMITS
0225  REF  17 LAST 610   26,2313  26 072 0             ADS     ITEMP5
0226  REF 291 LAST 593   26,2314  0 0002 0             TC      Q                  RETURN

R0227  THIS PROGRAM INITIALIZES THE KALMAN FILTER PROGRAM.

0228  REF   3 LAST 605   26,2315  23'552 1   FILFIRST  LXCH    DAPTIME            INITIALIZE TIME.
0229  REF   1            26,2316  3 2371 0             CAF     POINT=90           INITIALIZE THE WEIGHTING VECTOR POINTER
0230  REF   5 LAST 605   26,2317  55'556 1             TS      WPOINTER
0231  REF   1            26,2320  3 2014 0             CAF     MOSTPASS           SET UP FOR NEXT PASSES
0232  REF   3 LAST 605   26,2321  55'553 1             TS      STEERADR
0233                     26,2322  0 0006 1             EXTEND                     SET UP POST FILTER RUPT LIST
0234  REF   1            26,2323  3 2375 1             DCA     DGTSFADR
0235  REF   7 LAST 604   26,2324  53'604 0             DXCH    PFRPTLST
0236                     26,2325  0 0006 1             EXTEND
0237  REF   2 LAST 604   26,2326  3 2071 0             DCA     PAX/FILT
0238  REF   8 LAST 610   26,2327  53'606 1             DXCH    PFRPTLST +2
0239                     26,2330  0 0006 1             EXTEND
0240  REF   3 LAST 610   26,2331  3 2071 0             DCA     PAX/FILT
0241  REF   9 LAST 610   26,2332  53'612 1             DXCH    PFRPTLST +6
0242                     26,2333  0 0006 1             EXTEND
0243  REF   2 LAST 609   26,2334  3 2400 1             DCA     GTS2CADR
0244  REF  10 LAST 610   26,2335  53'610 0             DXCH    PFRPTLST +4
0245                     26,2336  0 0006 1             EXTEND                     CHANGE POST P FILTER TO FILTER
0246  REF   1            26,2337  3 2402 0             DCA     POSTPFIL
0247  REF   3 LAST 560   26,2340  53'602 0             DXCH    PFILTADR

0248  REF   4 LAST 609   26,2341  31'547 0             CAE     STORCDUY
0249                     26,2342  0 0006 1             EXTEND
0250  REF  44 LAST 595   26,2343  7 7642 1             MP      BIT14
0251  REF   3 LAST 609   26,2344  53'563 1             DXCH    CDUYFIL            INITIALIZE THE STATE VECTOR TO CDU VALUE
0252  REF   3 LAST 609   26,2345  31'550 0             CAE     STORCDUZ
0253                     26,2346  0 0006 1             EXTEND
0254  REF  45 LAST 610   26,2347  7 7642 1             MP      BIT14
0255  REF   1            26,2350  53'565 1             DXCH    CDUZFIL
0256  REF 223 LAST 606   26,2351  3 7665 0             CA      ZERO
0257  REF   3 LAST 609   26,2352  55'566 1             TS      DCDUYFIL           INITIALIZE THE DERIVATIVES OF THE STATE
0258  REF   4 LAST 610   26,2353  55'567 0             TS      DCDUYFIL +1
0259  REF   1            26,2354  55'570 0             TS      DCDUZFIL
0260  REF   2 LAST 610   26,2355  55'571 1             TS      DCDUZFIL +1
0261  REF   3 LAST 609   26,2356  55'572 1             TS      D2CDUYFL
0262  REF   4 LAST 610   26,2357  55'573 0             TS      D2CDUYFL +1
0263  REF   1            26,2360  55'574 1             TS      D2CDUZFL
0264  REF   2 LAST 610   26,2361  55'575 0             TS      D2CDUZFL +1
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 0265   REF   2 LAST 606     26,2362   55'576 0               TS      Y3DOT
 0266   REF   1              26,2363   55'600 1               TS      Z3DOT
 0267   REF   3 LAST 538     26,2364   55'532 0               TS      NEGUQ
 0268   REF   1              26,2365   55'534 0               TS      NEGUR
 0269   REF  36 LAST 609     26,2366   1 4606 1               TCF     RESUME



 0270                        26,2367    24366 1  .64          DEC     0.64000
 0271                        26,2370    14000 1  BIT12-13     OCTAL   14000
 0272                        26,2371    00132 1  POINT=90     DEC     90                       POINTER INITIALIZED ONE GROUP PAST END
 0273                        26,2372    37776 0  MS20F        OCTAL   37776
 0274                        26,2373    37775 0  MS30F        OCTAL   37775
 0275                        26,2374    02535 0  DGTSFADR     2CADR   DGTS
C0275   REF   1              26,2375    54006 0
 0276   REF   3 LAST 605     26,2376    02055 0  PAXISADR     GENADR  PAXIS
 0277                        26,2377    02564 1  GTS2CADR     2CADR   GTS
C0277   REF   1              26,2400    54006 0
 0278                        26,2401    02015 1  POSTPFIL     2CADR   FILTER
C0278   REF   1              26,2402    54006 0
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P0279   THE KALMAN FILTER WEIGHTINF VECTORS ARE LISTED IN THE FOLLOWING TABLE ALONG WITH THE TIME FROM THE LAST FILTER
R0281   INITIALIZATION FOR WHICH THEY ARE TO BE USED.  (THE VECTORS ARE STORED IN ORDERED TRIPLES (W0,W1,W2) IN
R0283   DESCENDING ORDER IN TIME WITH THE STEADY STATE VALUES AT THE TOP.)

R0284   THE COMPONENTS ARE SCALED AS FOLLOWS:
R0285             W0 : SCALED AT  2
R0286             W1 : SCALED AT 32
R0287             W2 : SCALED AT  8

 0288                     26,2403   05751 1  WVECTOR  DEC      0.18608          W0 FROM RELATIVE TIME 1.5 SECS OR MORE
 0289                     26,2404   00672 1           DEC      0.02696          W1 FROM RELATIVE TIME 1.5 SECS OR MORE
 0290                     26,2405   05362 0           DEC      0.17105          W2 FROM RELATIVE TIME 1.5 SECS OR MORE
 0291                     26,2406   04460 1           DEC      0.14358          W0 AT RELATIVE TIME = 1.45 SECONDS
 0292                     26,2407   00731 1           DEC      0.02890          W1 AT RELATIVE TIME = 1.45 SECONDS
 0293                     26,2410   05530 1           DEC      0.17727          W2 AT RELATIVE TIME = 1.45 SECONDS
 0294                     26,2411   04522 0           DEC      0.14565          W0 AT RELATIVE TIME = 1.40 SECONDS
 0295                     26,2412   00745 1           DEC      0.02959          W1 AT RELATIVE TIME = 1.40 SECONDS
 0296                     26,2413   05632 0           DEC      0.18129          W2 AT RELATIVE TIME = 1.40 SECONDS
 0297                     26,2414   04572 0           DEC      0.14809          W0 AT RELATIVE TIME = 1.35 SECONDS
 0298                     26,2415   11602 0           DEC      0.30479          W1 AT RELATIVE TIME = 1.35 SECONDS
 0299                     26,2416   05764 1           DEC      0.18678          W2 AT RELATIVE TIME = 1.35 SECONDS
 0300                     26,2417   04650 0           DEC      0.15090          W0 AT RELATIVE TIME = 1.30 SECONDS
 0301                     26,2420   01005 0           DEC      0.03154          W1 AT RELATIVE TIME = 1.30 SECONDS
 0302                     26,2421   06153 0           DEC      0.19403          W2 AT RELATIVE TIME = 1.30 SECONDS
 0303                     26,2422   04735 1           DEC      0.15409          W0 AT RELATIVE TIME = 1.25 SECONDS
 0304                     26,2423   01032 1           DEC      0.03283          W1 AT RELATIVE TIME = 1.25 SECONDS
 0305                     26,2424   06405 0           DEC      0.20340          W2 AT RELATIVE TIME = 1.25 SECONDS
 0306                     26,2425   05027 1           DEC      0.15767          W0 AT RELATIVE TIME = 1.20 SECONDS
 0307                     26,2426   01063 0           DEC      0.03437          W1 AT RELATIVE TIME = 1.20 SECONDS
 0308                     26,2427   06707 1           DEC      0.21525          W2 AT RELATIVE TIME = 1.20 SECONDS
 0309                     26,2430   05130 0           DEC      0.16163          W0 AT RELATIVE TIME = 1.15 SECONDS
 0310                     26,2431   01120 0           DEC      0.03616          W1 AT RELATIVE TIME = 1.15 SECONDS
 0311                     26,2432   07270 0           DEC      0.23000          W2 AT RELATIVE TIME = 1.15 SECONDS
 0312                     26,2433   05237 1           DEC      0.16595          W0 AT RELATIVE TIME = 1.10 SECONDS
 0313                     26,2434   01163 1           DEC      0.03824          W1 AT RELATIVE TIME = 1.10 SECONDS
 0314                     26,2435   07742 1           DEC      0.24814          W2 AT RELATIVE TIME = 1.10 SECONDS
 0315                     26,2436   05354 0           DEC      0.17063          W0 AT RELATIVE TIME = 1.05 SECONDS
 0316                     26,2437   01232 0           DEC      0.04062          W1 AT RELATIVE TIME = 1.05 SECONDS
 0317                     26,2440   10513 1           DEC      0.27018          W2 AT RELATIVE TIME = 1.05 SECONDS
 0318                     26,2441   05475 1           DEC      0.17560          W0 AT RELATIVE TIME = 1.00 SECONDS
 0319                     26,2442   01306 0           DEC      0.04332          W1 AT RELATIVE TIME = 1.00 SECONDS
 0320                     26,2443   11375 0           DEC      0.29668          W2 AT RELATIVE TIME = 1.00 SECONDS
 0321                     26,2444   05622 1           DEC      0.18080          W0 AT RELATIVE TIME = 0.95 SECONDS
 0322                     26,2445   01367 1           DEC      0.04634          W1 AT RELATIVE TIME = 0.95 SECONDS
 0323                     26,2446   12402 1           DEC      0.32824          W2 AT RELATIVE TIME = 0.95 SECONDS
 0324                     26,2447   05752 1           DEC      0.18614          W0 AT RELATIVE TIME = 0.90 SECONDS
 0325                     26,2450   01456 1           DEC      0.04968          W1 AT RELATIVE TIME = 0.90 SECONDS
 0326                     26,2451   13541 0           DEC      0.36531          W2 AT RELATIVE TIME = 0.90 SECONDS
 0327                     26,2452   06101 1           DEC      0.19147          W0 AT RELATIVE TIME = 0.85 SECONDS
 0328                     26,2453   01551 1           DEC      0.05328          W1 AT RELATIVE TIME = 0.85 SECONDS
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L       @KALMAN FILTER FOR LEM DAP                                              USER'S OWN PAGE NO.  10

 0329                   26,2454    15040 1          DEC       0.40821        W2 AT RELATIVE TIME = 0.85 SECONDS
 0330                   26,2455    06225 1          DEC       0.19659        W0 AT RELATIVE TIME = 0.80 SECONDS
 0331                   26,2456    01647 0          DEC       0.05707        W1 AT RELATIVE TIME = 0.80 SECONDS
 0332                   26,2457    16503 0          DEC       0.45721        W2 AT RELATIVE TIME = 0.80 SECONDS
 0333                   26,2460    06341 1          DEC       0.20122        W0 AT RELATIVE TIME = 0.75 SECONDS
 0334                   26,2461    01746 0          DEC       0.06089        W1 AT RELATIVE TIME = 0.75 SECONDS
 0335                   26,2462    20244 1          DEC       0.50999        W2 AT RELATIVE TIME = 0.75 SECONDS
 0336                   26,2463    06440 1          DEC       0.20505        W0 AT RELATIVE TIME = 0.70 SECONDS
 0337                   26,2464    02041 0          DEC       0.06451        W1 AT RELATIVE TIME = 0.70 SECONDS
 0338                   26,2465    22055 1          DEC       0.56522        W2 AT RELATIVE TIME = 0.70 SECONDS
 0339                   26,2466    06514 1          DEC       0.20775        W0 AT RELATIVE TIME = 0.65 SECONDS
 0340                   26,2467    02123 0          DEC       0.06759        W1 AT RELATIVE TIME = 0.65 SECONDS
 0341                   26,2470    23610 1          DEC       0.61768        W2 AT RELATIVE TIME = 0.65 SECONDS
 0342                   26,2471    06542 1          DEC       0.20912        W0 AT RELATIVE TIME = 0.60 SECONDS
 0343                   26,2472    02166 1          DEC       0.06972        W1 AT RELATIVE TIME = 0.60 SECONDS
 0344                   26,2473    25072 0          DEC       0.65979        W2 AT RELATIVE TIME = 0.60 SECONDS
 0345                   26,2474    06546 0          DEC       0.20934        W0 AT RELATIVE TIME = 0.55 SECONDS
 0346                   26,2475    02205 1          DEC       0.07062        W1 AT RELATIVE TIME = 0.55 SECONDS
 0347                   26,2476    25640 1          DEC       0.68165        W2 AT RELATIVE TIME = 0.55 SECONDS
 0348                   26,2477    06543 0          DEC       0.20919        W0 AT RELATIVE TIME = 0.50 SECONDS
 0349                   26,2500    02177 1          DEC       0.07028        W1 AT RELATIVE TIME = 0.50 SECONDS
 0350                   26,2501    25427 1          DEC       0.67330        W2 AT RELATIVE TIME = 0.50 SECONDS
 0351                   26,2502    06564 0          DEC       0.21020        W0 AT RELATIVE TIME = 0.45 SECONDS
 0352                   26,2503    02160 1          DEC       0.06931        W1 AT RELATIVE TIME = 0.45 SECONDS
 0353                   26,2504    24077 1          DEC       0.62883        W2 AT RELATIVE TIME = 0.45 SECONDS
 0354                   26,2505    06671 1          DEC       0.21441        W0 AT RELATIVE TIME = 0.40 SECONDS
 0355                   26,2506    02154 0          DEC       0.06908        W1 AT RELATIVE TIME = 0.40 SECONDS
 0356                   26,2507    21470 1          DEC       0.55030        W2 AT RELATIVE TIME = 0.40 SECONDS
 0357                   26,2510    07125 0          DEC       0.22391        W0 AT RELATIVE TIME = 0.35 SECONDS
 0358                   26,2511    02225 0          DEC       0.07162        W1 AT RELATIVE TIME = 0.35 SECONDS
 0359                   26,2512    16256 1          DEC       0.44810        W2 AT RELATIVE TIME = 0.35 SECONDS
 0360                   26,2513    07544 0          DEC       0.24049        W0 AT RELATIVE TIME = 0.30 SECONDS
 0361                   26,2514    02430 1          DEC       0.07956        W1 AT RELATIVE TIME = 0.30 SECONDS
 0362                   26,2515    12624 1          DEC       0.33713        W2 AT RELATIVE TIME = 0.30 SECONDS
 0363                   26,2516    10401 0          DEC       0.26566        W0 AT RELATIVE TIME = 0.25 SECONDS
 0364                   26,2517    03054 0          DEC       0.09646        W1 AT RELATIVE TIME = 0.25 SECONDS
 0365                   26,2520    07317 0          DEC       0.23140        W2 AT RELATIVE TIME = 0.25 SECONDS
 0366                   26,2521    11507 0          DEC       0.30123        W0 AT RELATIVE TIME = 0.20 SECONDS
 0367                   26,2522    04070 1          DEC       0.12841        W1 AT RELATIVE TIME = 0.20 SECONDS
 0368                   26,2523    04404 0          DEC       0.14087        W2 AT RELATIVE TIME = 0.20 SECONDS
 0369                   26,2524    13146 0          DEC       0.34996        W0 AT RELATIVE TIME = 0.15 SECONDS
 0370                   26,2525    06020 0          DEC       0.18850        W1 AT RELATIVE TIME = 0.15 SECONDS
 0371                   26,2526    02213 0          DEC       0.07101        W2 AT RELATIVE TIME = 0.15 SECONDS
 0372                   26,2527    15230 1          DEC       0.41554        W0 AT RELATIVE TIME = 0.10 SECONDS
 0373                   26,2530    11756 0          DEC       0.31141        W1 AT RELATIVE TIME = 0.10 SECONDS
 0374                   26,2531    00613 0          DEC       0.02408        W2 AT RELATIVE TIME = 0.10 SECONDS
 0375                   26,2532    17670 0          DEC       0.49561        W0 AT RELATIVE TIME = 0.05 SECONDS
 0376                   26,2533    23514 0          DEC       0.61404        W1 AT RELATIVE TIME = 0.05 SECONDS
 0377                   26,2534    00001 0          DEC       0.00006        W2 AT RELATIVE TIME = 0.05 SECONDS
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P0378   DJMMY TRIM GIMBAL RUPT:

 0379   REF    1               26,2535  3 2373 1  DGTS      CAF     MS30F           RESET TIMER IMMEDIATELY: DT = 30 MS
 0380   REF    8 LAST 604      26,2536  54 030 0            TS      TIME5

 0381   REF   15 LAST 604      26,2537  22 016 0            LXCH    BANKRUPT        INTERRUPT LEAD IN (CONTINUED)

 0382                          26,2540  0 0006 1            EXTEND                  SET UP FILTER RUPT
 0383   REF    2 LAST 610      26,2541  3 2402 0            DCA     POSTpFIL
 0384   REF   13 LAST 609      26,2542  52 346 1            DXCH    T5ADR

 0385   REF    4 LAST 556      26,2543  1 4610 0            TCF     NOQRSM

R0386   DJMMY FILTER RUPT AFTER P-AXIS RUPT:

 0387   REF    3 LAST 604      26,2544  3 2372 0  DUMMYFIL  CAF     MS20F           RESET TIMER IMMEDIATELY: DT = 20 MS
 0388   REF    9 LAST 614      26,2545  54 030 0            TS      TIME5

 0389   REF   16 LAST 614      26,2546  22 016 0            LXCH    BANKRUPT        INTERRUPT LEAD IN (CONTINUED)

 0390                          26,2547  0 0006 1            EXTEND                  SET UP QRAXIS RUPT
 0391   REF    1               26,2550  3 2554 1            DCA     DFQRAXIS
 0392   REF   14 LAST 614      26,2551  52 346 1            DXCH    T5ADR

 0393   REF    5 LAST 614      26,2552  1 4610 0            TCF     NOQRSM

 0394                          26,2553    02002 1  DFQRAXIS 2CADR   QRAXIS
C0394   REF    1               26,2554    50006 1


R0395   DJMMY FILTER RUPT AFTER Q,R-AXES RUPT:

 0396   REF    4 LAST 614      26,2555  3 2372 0  FILDUMMY  CAF     MS20F           RESET TIMER IMMEDIATELY: DT = 20 MS
 0397   REF   10 LAST 614      26,2556  54 030 0            TS      TIME5

 0398   REF   17 LAST 614      26,2557  22 016 0            LXCH    BANKRUPT        INTERRUPT LEAD IN (CONTINUED)

 0399                          26,2560  0 0006 1            EXTEND                  SET UP PAXIS RUPT
 0400   REF    4 LAST 610      26,2561  3 2071 0            DCA     pAX/FILT
 0401   REF   15 LAST 614      26,2562  52 346 1            DXCH    T5ADR

 0402   REF   37 LAST 611      26,2563  1 4606 1            TCF     RESUME
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L       @TRIM GIMBAL CONTROL SYSTEM                                                   USER'S OWN PAGE NO.   1

R0001   CONTROL REACHES THIS POINT UNDER EITHER OF THE FOLLOWING TWO CONDITIONS ONCE THE DESCENT ENGINE AND THE DIGITAL
R0003   AUTOPILOT ARE BOTH ON:
R0004           A) THE TRIM GIMBAL CONTROL LAW WAS ON DURING THE PREVIOUS Q,R-AXIS TIME5 INTERRUPT (OR THE DAPIDLER
R0006              INITIALIZATION WAS SET FOR TRIM GIMBAL CONTROL AND THIS IS THE FIRST PASS), OR
R0008           B) THE Q,R-AXIS RCS JET CONTROL LAW ATTITUDE STEERING MODE REDUCED THE ATTITUDE ERROR TO LESS THAN
R0010   1DEGREE ON EACH AXIS ON ITS LAST TIME5 INTERRUPT.

R0011   THE FOLLOWING T5RUPT ENTRY BEGINS THE TRIM GIMBAL CONTROL LAW.  SINCE IT IS ASSUMED THAT THE LEM WILL REMAIN
R0013   UNDER TRIM GIMBAL CONTROL, A KALMAN FILTER RUPT IS SET UP TO BEGIN 30 MS FROM THE TRIM GIMBAL RUPT.

 0015   REF   2 LAST 614      26,2564  3 2373 1  GTS        CAF    MS30F           RESET TIMER IMMEDIATELY: DT = 30 MS
 0016   REF  11 LAST 614      26,2565  54 030 0             TS     TIME5

 0017   REF  18 LAST 614      26,2566  22 016 0             LXCH   BANKRUPT        INTERRUPT LEAD IN (CONTINUED)
 0018                         26,2567  0 0006 1             EXTEND
 0019   REF  14 LAST 604      26,2570  22 012 1             QXCH   QRUPT

 0020                         26,2571  0 0006 1             EXTEND
 0021   REF   3 LAST 614      26,2572  3 2402 0             DCA    POSTPFIL
 0022   REF  16 LAST 614      26,2573  52 346 1             DXCH   T5ADR

 0023   REF   1               26,2574  1 2666 1             TCF    GTSTEST         SKIP OVER XFORMS UNTIL REORGANIZATION

 0024                         26,2575  0 0006 1  GIMBAL     EXTEND                 GET D.P. FILTERED CDUY VALUE (ONES COMP)
 0025   REF   4 LAST 610      26,2576  3 1563 0             DCA    CDUYFIL         SCALED AT 2PI RADIANS
 0026   REF   2 LAST 608      26,2577  0 2302 1             TC     ONETOTWO        FORM S.P. VALUE IN TWOS COMPLEMENT AT PI
 0027                         26,2600  0 0006 1             EXTEND
 0028   REF   7 LAST 576      26,2601  20 775 0             MSU    CDUYD           FORM Y-AXIS ERROR IN ONES COMPLEMENT
 0029   REF   2 LAST 578      26,2602  55'477 0             TS     QDIFF           (SAVE IN Q-AXIS ERROR LOC: EFFICIENCY)

 0030                         26,2603  0 0006 1             EXTEND                 GET D.P. FILTERED CDUZ VALUE (ONES COMP)
 0031   REF   2 LAST 610      26,2604  3 1565 0             DCA    CDUZFIL         SCALED AT 2PI RADIANS
 0032   REF   3 LAST 615      26,2605  0 2302 1             TC     ONETOTWO        FORM S.P. VALUE IN TWOS COMPLEMENT AT PI
 0033                         26,2606  0 0006 1             EXTEND
 0034   REF   6 LAST 576      26,2607  20 776 0             MSU    CDUZD           FORM Z-AXIS ERROR IN ONES COMPLEMENT
 0035   REF   1               26,2610  55'500 1             TS     RDIFF           (SAVE IN R-AXIS ERROR LOC: EFFICIENCY)

R0036   TRANSFORM Y,Z CDU ERRORS TO THE Q,R-AXES.

 0037                         26,2611  0 0006 1             EXTEND                 GET BOTH Y AND Z CDU ERRORS AT PI RAD
 0038   REF   3 LAST 615      26,2612  3 1500 0             DCA    QDIFF
 0039   REF   1               26,2613  0 3421 0             TC     QTRANSF         FORM Q-ERROR IN A (SCALED AT PI RAD)
 0040   REF   4 LAST 615      26,2614  53'500 1             DXCH   QDIFF           STORE Q-ERROR, GET BOTH Y,Z CDU ERRORS
 0041   REF   1               26,2615  0 3431 1             TC     RTRANSF         FORM R-ERROR IN A (SCALED AT PI RAD)
 0042   REF   2 LAST 615      26,2616  57'500 0             XCH    RDIFF           STORE R-ERROR

R0043   TRANSFORM THE FILTERED Y,Z RATES TO THE Q,R-AXES.
R0044   (THESE MAY BE NEEDED FOR THE RATE DERIVATION FOR THE JETS IF THEY MUST BE USED.)

 0046   REF   3 LAST 610      26,2617  31'570 1             CAE    DCDUZFIL        GET FILTERED Y,Z RATES
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L         @TRIM GIMBAL CONTROL SYSTEM                                                       USER'S OWN PAGE NO.   2

  0047    REF 215 LAST 609      26,2620  54 001 1           TS       L              SCALED AT PI/4 RADIANS/SECOND
  0048    REF   5 LAST 610      26,2621  31'566 0           CAE      DCDUYFIL
  0049    REF   2 LAST 615      26,2622  0 3421 0           TC       QTRANSF        FOR Q-AXIS RATE
  0050    REF  12 LAST 589      26,2623  55'417 0           TS       OMEGAQ         STORED SCALED AT PI/4 RADIANS/SECOND

  0051    REF   4 LAST 615      26,2624  31'570 1           CAE      DCDUZFIL       GET FILTERED Y,Z RATES
  0052    REF 216 LAST 616      26,2625  54 001 1           TS       L              SCALED AT PI/4 RADIANS/SECOND
  0053    REF   6 LAST 616      26,2626  31'566 0           CAE      DCDUYFIL
  0054    REF   2 LAST 615      26,2627  0 3431 1           TC       RTRANSF        FOR R-AXIS RATE
  0055    REF  12 LAST 589      26,2630  55'421 0           TS       OMEGAR         STORED SCALED AT PI/4 RADIANS/SECOND

R0056     TRANSFORM THE FILTERED Y,Z ACCELERATIONS TO THE Q,R-AXES.
R0057     (THESE MAY BE NEEDED TO CALCULATE TRIM GIMBAL OFF-TIMES IF ATTITUDE ERROR HAS GONE BEYOND TRIM GIMBAL CONTROL.)

  0059    REF   3 LAST 610      26,2631  31'574 0           CAE      D2CDUZFL       GET FILTERED Y,Z ACCELERATIONS
  0060    REF 217 LAST 616      26,2632  54 001 1           TS       L              SCALED AT PI/8 RADIANS/SECOND(2)
  0061    REF   5 LAST 610      26,2633  31'572 0           CAE      D2CDUYFL
  0062    REF   3 LAST 616      26,2634  0 3421 0           TC       QTRANSF        FORM Q-AXIS ACCELERATION
  0063    REF   1               26,2635  55'420 1           TS       ALPHAQ         STORE AT PI/8 RADIANS/SECOND(2)

  0064    REF   4 LAST 616      26,2636  31'574 0           CAE      D2CDUZFL       GET FILTERED Y,Z ACCELERATIONS
  0065    REF 218 LAST 616      26,2637  54 001 1           TS       L              SCALED AT PI/8 RADIANS/SECOND(2)
  0066    REF   6 LAST 616      26,2640  31'572 0           CAE      D2CDUYFL
  0067    REF   3 LAST 616      26,2641  0 3431 1           TC       RTRANSF        FORM R-AXIS ACCELERATION
  0068    REF   1               26,2642  55'422 0           TS       ALPHAR         STORE AT PI/8 RADIANS/SECOND(2)

R0069     EXTRAPOLATE THETA AND OMEGA OVER THE 20 MS DELAY BETWEEN THE KALMAN FILTER AND THE TRIM GIMBAL CONTROL.

  0071    REF  13 LAST 616      26,2643  31'417 1           CAE      OMEGAQ
  0072                          26,2644  0 0006 1           EXTEND
  0073    REF   1               26,2645  7 2664 0           MP       DTW
  0074    REF   5 LAST 615      26,2646  27'477 0           ADS      QDIFF

  0075    REF  13 LAST 616      26,2647  31'421 1           CAE      OMEGAR
  0076                          26,2650  0 0006 1           EXTEND
  0077    REF   2 LAST 616      26,2651  7 2664 0           MP       DTW
  0078    REF   3 LAST 615      26,2652  27'500 1           ADS      RDIFF

  0079    REF   2 LAST 616      26,2653  31'420 0           CAE      ALPHAQ
  0080                          26,2654  0 0006 1           EXTEND
  0081    REF   1               26,2655  7 2665 1           MP       DTA
  0082    REF  14 LAST 616      26,2656  27'417 0           ADS      OMEGAQ

  0083    REF   2 LAST 616      26,2657  31'422 1           CAE      ALPHAR
  0084                          26,2660  0 0006 1           EXTEND
  0085    REF   2 LAST 616      26,2661  7 2665 1           MP       DTA
  0086    REF  14 LAST 616      26,2662  27'421 0           ADS      OMEGAR

  0087    REF  38 LAST 614      26,2663  1 4606 1           TCF      RESUME
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 0088                         26,2664   00122 0  DTW        DEC      .005
 0089                         26,2665   00051 0  DTA        DEC      .0025

R0090   TEST TO SEE IF TRIM GIMBAL CONTROL LAW HAS KEPT BOTH ATTITUDE ERRORS BELOW THE 1 DEGREE BOUNDARY WITH THE REGION
R0092   OF RCS CONTROL LAW DOMINANCE OR IS STILL REDUCING THE ERROR.

 0093   REF  30 LAST 577      26,2666  3 7656 0  GTSTEST    CAF      BIT2               VERIFY THAT GTS IS STILL OPERATIVE
 0094   REF  41 LAST 594      26,2667  7 0765 1             MASK     DAPBOOLS
 0095   REF 367 LAST 610      26,2670  10 000 0             CCS      A
 0096   REF   1               26,2671  1 2723 1             TCF      RCSCNTRL           GTS NOT OPERATIVE
 0097   REF  50 LAST 577      26,2672  3 7657 1             CAF      BIT1
 0098   REF  18 LAST 609      26,2673  54 073 1  LOOPTEST   TS       QRCNTR
 0099   REF  19 LAST 617      26,2674  50 073 0             INDEX    QRCNTR
 0100   REF   6 LAST 616      26,2675  11'477 0             CCS      QDIFF              SCALED AT PI.
 0101   REF   1               26,2676  6 2721 1             AD       -TGBND+1           -2 DEG SCALED AT PI, + 1 BIT.
 0102                         26,2677  1 2701 1             TCF      +2
 0103   REF   2 LAST 617      26,2700  6 2721 1             AD       -TGBND+1
 0104                         26,2701  0 0006 1             EXTEND
 0105                         26,2702  6 2704 0             BZMF     +2                 IS ERROR MAG LESS,EQUAL 2 DEG.
 0106   REF   2 LAST 617      26,2703  1 2723 1             TCF      RCSCNTRL           NO.    GO TO JETS.
 0107   REF  20 LAST 617      26,2704  3 0073 0             CA       QRCNTR             YES.  TRY RATE MAGNITUDE.
 0108                         26,2705  6 0000 1             DOUBLE
 0109   REF 368 LAST 617      26,2706  50 000 1             INDEX    A
 0110   REF  15 LAST 616      26,2707  11'417 0             CCS      OMEGAQ             SCALED AT PI/4.
 0111   REF   1               26,2710  6 2722 1             AD       -RATBD+1           -.65 DEG/SEC SCALED AT PI/4   + 1 BIT
 0112                         26,2711  1 2713 1             TCF      +2
 0113   REF   2 LAST 617      26,2712  6 2722 1             AD       -RATBD+1
 0114                         26,2713  0 0006 1             EXTEND
 0115                         26,2714  6 2716 0             BZMF     +2                 IS RATE MAG LESS,EQUAL .65 DEG/SEC.
 0116   REF   3 LAST 617      26,2715  1 2723 1             TCF      RCSCNTRL           NO.    GO TO JETS.
 0117   REF  21 LAST 617      26,2716  10 073 1             CCS      QRCNTR             YES.  THIS AXIS IS FINE. ARE BOTH DONE.
 0118   REF   1               26,2717  1 2673 0             TCF      LOOPTEST           TRY THE Q AXIS NOW.
 0119   REF   1               26,2720  1 2766 0             TCF      GTSRAXIS           USE TRIM GIMBAL CONTROL.
 0120                         26,2721   77512 1  -TGBND+1   OCT      77512              -2 DEG SCALED AT PI, + 1 BIT.
 0121                         26,2722   77423 1  -RATBD+1   OCT      77423              -.65 DEG/SEC SCALED AT PI/4   + 1 BIT
R0126   ATTITUDE ERROR IS BEYOND TRIM GIMBAL CONTROL LAW RANGE.  SET UP FOR RCS CONTROL LAW (Q,R-AXIS) AND CALCULATE
R0128   TIMES TO TURN OFF THE GIMBAL DRIVES.

 0129   REF   1               26,2723  3 2745 0  RCSCNTRL   CAF      POSTQRFL           CHANGE LOCATION OF NEXT T5RUPT FROM
 0130   REF  17 LAST 615      26,2724  54 345 1             TS       T5ADR              FILTER TO FILDUMMY

 0131   REF   1               26,2725  3 2746 0             CAF      QRJPFILT           SET UP POST P-AXIS T5RUPT TO GO TO
 0132   REF   4 LAST 610      26,2726  55'601 0             TS       PFILTADR           DUMMYFIL INSTEAD OF FILTER

 0133  *          DELETE THROUGH 0134
 0135                         26,2727  0 0006 1             EXTEND                      PREPARE FOR SEQUENCED RESUMPTION OF
 0136   REF  18 LAST 605      26,2730  3 0034 0             DCA      CDUY               Q,R-AXIS RCS CONTROL RATE DERIVATION
 0137   REF   4 LAST 562      26,2731  53'434 1             DXCH     OLDYFORQ           BY PROVIDING OLD CDU READINGS

 0138                         26,2732  0 0006 1             EXTEND                      MOVE FILTERED AND TRANSFORMED ATTITUDE
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L       @TRIM GIMBAL CONTROL SYSTEM                                                               USER'S OWN PAGE NO.   4

 0139   REF    7 LAST 617    26,2733  3 1500 0            DCA      QDIFF          ERRORS INTO ERASABLE FOR Q,R-AXIS RCS
 0140   REF    4 LAST 577    26,2734  57'500 0            XCH      RERROR         CONTROL: NOTE THAT THE AXES SEEM TO BE
 0141   REF    4 LAST 577    26,2735  23'477 1            LXCH     QERROR         INTERCHANGED BUT ARE NOT CONFUSED

 0142   REF  157 LAST 610    26,2736  3 7657 1            CAF      ONE
 0143   REF   80 LAST 559    26,2737  0 4536 0            TC       WAITLIST
 0144                        26,2740   02751 0            2CADR    CHEKDRIV       DO TGOFF CALCULATION IN WAITLIST TASK
C0144   REF    1             26,2741   54006 0
 0145                        26,2742  0 0006 1            EXTEND                  GO TO Q,R-AXES CONTROL IMMEDIATELY
 0146   REF    1             26,2743  3 2750 1            DCA      TGENTRY
 0147                        26,2744  52 006 0            DTCB

 0148   *          DELETE
 0149   REF    2 LAST 562    26,2745   02555 0  POSTQRFL  GENADR   FILDUMMY
 0150   REF    2 LAST 560    26,2746   02544 0  QRJPFILT  GENADR   DUMMYFIL
 0151                        26,2747   03122 0  TGENTRY   2CADR    STILLRCS
C0151   REF    6 LAST 578    26,2750   50006 1


 0152   REF  224 LAST 610    26,2751  3 7665 0  CHEKDRIV  CAF      ZERO           CALCULATE Q-AXIS GIMBAL DRIVE SHUTDOWN T
 0153   REF    1             26,2752  0 3442 0            TC       TGOFFCAL
 0154   REF   81 LAST 618    26,2753  0 4536 0            TC       WAITLIST
 0155                        26,2754   03370 0            2CADR    OFFGIMQ
C0155   REF    1             26,2755   54006 0
 0156   REF   84 LAST 606    26,2756  3 7656 0            CAF      TWO            CALCULATE R-AXIS GIMBAL DRIVE SHUTDOWN T
 0157   REF    2 LAST 618    26,2757  0 3442 0            TC       TGOFFCAL
 0158   REF   82 LAST 618    26,2760  0 4536 0            TC       WAITLIST
 0159                        26,2761   03373 0            2CADR    OFFGIMR
C0159   REF    1             26,2762   54006 0
 0160   REF    1             26,2763  0 3400 0            TC       WRCHN12        SET UP NEW DRIVES AS OF NOW

 0161   REF   66 LAST 560    26,2764  1 4602 0            TCF      TASKOVER
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L       @TRIM GIMBAL CONTROL SYSTEM                                                    USER'S OWN PAGE NO.    5

P0162   THE DRIVE SETTING ALGORITHM
R0163   DEL = SGN(OMEGA.K + SGN(ALPHA)ALPHA(2)/2)     ONLY +1/-1

R0164   NEGUSUM = ERROR.K(2) + DEL((OMEGA.K.DEL + ALPHA(2)/2)(3/2) + (OMEGA.K.DEL + ALPHA(2)/3)ALPHA

R0166   DRIVE = -SGN(NEGUSUM)

 0167                         26,2765    76504 1  -.04266   DEC     -.04266
 0168   REF  85 LAST 618      26,2766  3 7656 0  GTSRAXIS CAF     TWO                 SET INDEXER FOR R-AXIS CALCULATIONS
 0169   REF  22 LAST 617      26,2767  54 073 1            TS      QRCNTR
 0170   REF   1               26,2770  1 2773 1            TCF     GTSQAXIS

 0171   REF 225 LAST 618      26,2771  3 7665 0  GOQTRIMG CAF     ZERO                SET INDEXER FOR Q-AXIS CALCULATIONS
 0172   REF  23 LAST 619      26,2772  54 073 1            TS      QRCNTR

 0173                         26,2773  0 0006 1  GTSQAXIS EXTEND
 0174   REF  24 LAST 619      26,2774  5 0073 0            INDEX   QRCNTR              PICK UP K AND K(2) FOR THIS AXIS
 0175   REF   5 LAST 559      26,2775  3 1536 0            DCA     KQ
 0176   REF   1               26,2776  52 066 0            DXCH    KCENTRAL

 0177                         26,2777  0 0006 1            EXTEND
 0178   REF  25 LAST 619      26,3000  5 0073 0            INDEX   QRCNTR              PICK UP OMEGA AND ALPHA FOR THIS AXIS
 0179   REF  16 LAST 617      26,3001  3 1420 0            DCA     OMEGAQ
 0180   REF   1               26,3002  52 071 0            DXCH    WCENTRAL

 0181   REF  26 LAST 619      26,3003  30 073 0            CAE     QRCNTR
 0182                         26,3004  0 0006 1            EXTEND
 0183                         26,3005  1 3010 1            BZF      +3
 0184   REF   4 LAST 616      26,3006  31'500 0            CAE     RDIFF
 0185                         26,3007  1 3011 0            TCF      +2
 0186   REF   8 LAST 618      26,3010  31'477 1            CAE     QDIFF

 0187                         26,3011  0 0006 1            EXTEND                      RESCALE DIFFERENCE BY MULTIPLYING BY
 0188   REF  37 LAST 607      26,3012  7 7651 0            MP      BIT7                2(6)
 0189   REF   1               26,3013  22 075 0            LXCH    ETHETA

 0190   REF   2 LAST 619      26,3014  30 065 1            CAE     KCENTRAL            TEST ON MAGNITUDE OF ACCDOT
 0191   REF   1               26,3015  6 2765 1            AD      -.04266
 0192                         26,3016  0 0006 1            EXTEND
 0193   REF   1               26,3017  6 3033 1            BZMF    ACCDOTSM            BRANCH IF ACCDOT IS SMALL

 0194   REF  46 LAST 610      26,3020  3 7642 0  ACCDOTLG CAF     BIT14               ACCDOT IS COMPARITIVELY LARGE
 0195   REF   1               26,3021  54 076 1            TS      SF1                 SET UP SCALE FACTORS
 0196   REF  21 LAST 546      26,3022  3 7644 0            CAF     BIT12
 0197   REF   1               26,3023  54 077 0  WSFTEST  TS      SF2

 0198   REF   2 LAST 619      26,3024  10 070 1            CCS     WCENTRAL            TEST ON MAGNITUDE OF OMEGA
 0199   REF   1               26,3025  6 3056 1            AD      -.04438
 01991                        26,3026  1 3030 0            TCF      +2
 01992  REF   2 LAST 619      26,3027  6 3056 1            AD      -.04438
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L       @TRIM GIMBAL CONTROL SYSTEM                                                          USER'S OWN PAGE NO.   6

 0200                          26,3030  0 0006 1            EXTEND
 0201   REF    1               26,3031  6 3047 1            BZMF     ASFTEST             IF SMALL, GO TO ALPHA TEST

 0202   REF    1               26,3032  1 3071 0            TCF      WLARGE

 0203   REF    3 LAST 619      26,3033  30 065 1  ACCDOTSM  CAE      KCENTRAL            RESCALE IF ACCDOT IS SMALL
 0204                          26,3034  0 0006 1            EXTEND
 0205   REF   27 LAST 565      26,3035  7 7653 1            MP       BIT5                RESCALE K BY MULTIPLYING BY 2(4)
 0206   REF    4 LAST 620      26,3036  22 065 1            LXCH     KCENTRAL
 0207   REF    5 LAST 620      26,3037  30 065 1            CAE      KCENTRAL
 0208                          26,3040  0 0006 1            EXTEND
 0209                          26,3041  7 0000 0            SQUARE
 0210   REF    1               26,3042  54 066 0            TS       K2CNTRAL
 0211   REF   47 LAST 607      26,3043  3 7646 1            CAF      BIT10               SET UP VARIABLE SCALE FACTORS
 0212   REF    2 LAST 619      26,3044  54 076 1            TS       SF1
 0213   REF   41 LAST 595      26,3045  3 7654 1            CAF      BIT4
 0214   REF    1               26,3046  1 3023 1            TCF      WSFTEST             GO TEST ON MAGNITUDE OF OMEGA

 0215   REF    1               26,3047  10 071 0  ASFTEST   CCS      ACENTRAL            TEST ON MAGNITUDE OF ALPHA
 0216   REF    1               26,3050  6 3057 0            AD       -.08882
 02161                         26,3051  1 3053 0            TCF       +2
 02162  REF    2 LAST 620      26,3052  6 3057 0            AD       -.08882
 0217                          26,3053  0 0006 1            EXTEND
 0218   REF    1               26,3054  6 3060 1            BZMF     WARESCAL            IF SMALL, GO TO W.A RESCALING
 0219   REF    2 LAST 620      26,3055  1 3071 0            TCF      WLARGE              IF LARGE, DO SAME AS IF W LARGE

 0220                          26,3056   76450 1  -.04438   DEC      -.04438
 0221                          26,3057   75120 0  -.08882   DEC      -.08882

 0222   REF    3 LAST 619      26,3060  30 070 0  WARESCAL  CAE      WCENTRAL            RESCALE OMEGA BY MULTIPLYING BY 2(4)
 0223                          26,3061  0 0006 1            EXTEND
 0224   REF   28 LAST 620      26,3062  7 7653 1            MP       BIT5
 0225   REF    4 LAST 620      26,3063  22 070 0            LXCH     WCENTRAL

 0226   REF    2 LAST 620      26,3064  30 071 1            CAE      ACENTRAL            RESCALE ALPHA BY MULTIPLYING BY 2(3)
 0227                          26,3065  0 0006 1            EXTEND
 0228   REF   42 LAST 620      26,3066  7 7654 0            MP       BIT4
 0229   REF    3 LAST 620      26,3067  22 071 1            LXCH     ACENTRAL

 0230   REF    1               26,3070  1 3101 0            TCF      ALGORTHM

 0231   REF    3 LAST 620      26,3071  30 076 0  WLARGE    CAE      SF1                 RESCALE VARIABLE SCALE FACTORS
 0232                          26,3072  0 0006 1            EXTEND
 0233   REF   27 LAST 564      26,3073  7 7643 0            MP       BIT13               SF1 = SF1*2(-2)
 0234   REF    4 LAST 620      26,3074  54 076 1            TS       SF1
 0235   REF    2 LAST 619      26,3075  30 077 1            CAE      SF2
 0236                          26,3076  0 0006 1            EXTEND
 0237   REF   42 LAST 586      26,3077  7 7652 0            MP       BIT6                SF2 = SF2*2(-9)
 0238   REF    3 LAST 620      26,3100  54 077 0            TS       SF2
 0239    REF    2 LAST 619      26,3101   30 075 0  ALGORTHM CAE    ETHETA         GET RESCALED ERROR THETA
 0240                           26,3102   0 0006 1           EXTEND
 0241    REF    2 LAST 620      26,3103   7 0066 0           MP     K2CNTRAL       FORM K(2)*THETA IN D.P.
 0242    REF    1               26,3104   22 074 1           LXCH   K2THETA
 0243                           26,3105   0 0006 1           EXTEND                FORM K(2)*THETA*SF2 IN D.P.
 0244    REF    4 LAST 620      26,3106   7 0077 0           MP     SF2
 0245    REF    2 LAST 621      26,3107   52 075 1           DXCH   K2THETA
 0246                           26,3110   0 0006 1           EXTEND
 0247    REF    5 LAST 621      26,3111   7 0077 0           MP     SF2
 0248    REF    3 LAST 621      26,3112   26 075 1           ADS    K2THETA +1

 0249    REF    5 LAST 620      26,3113   30 070 0           CAE    WCENTRAL       GET OMEGA
 0250                           26,3114   0 0006 1           EXTEND
 0251    REF    6 LAST 620      26,3115   7 0065 0           MP     KCENTRAL       FORM K*OMEGA IN D.P.
 0252    REF    1               26,3116   22 065 1           LXCH   OMEGA.K
 0253                           26,3117   0 0006 1           EXTEND                FORM OMEGA*K*SF1 IN D.P.
 0254    REF    5 LAST 620      26,3120   7 0076 1           MP     SF1
 0255    REF    2 LAST 621      26,3121   52 066 0           DXCH   OMEGA.K
 0256                           26,3122   0 0006 1           EXTEND
 0257    REF    6 LAST 621      26,3123   7 0076 1           MP     SF1
 0258    REF    3 LAST 621      26,3124   26 066 0           ADS    OMEGA.K +1

 0259    REF    4 LAST 620      26,3125   30 071 1           CAE    ACENTRAL       FORM ALPHA(2) IN D.P.
 0260                           26,3126   0 0006 1           EXTEND
 0261                           26,3127   7 0000 0           SQUARE
 0262    REF    1               26,3130   52 077 0           DXCH   A2CNTRAL

 0263    REF    5 LAST 621      26,3131   30 071 1           CAE    ACENTRAL       GET SGN(ALPHA)
 0264                           26,3132   0 0006 1           EXTEND
 0265                           26,3133   6 3137 1           BZMF    +4
 0266                           26,3134   0 0006 1           EXTEND
 0267    REF    2 LAST 621      26,3135   3 0077 1           DCA    A2CNTRAL
 0268                           26,3136   1 3141 1           TCF     +3
 0269                           26,3137   0 0006 1           EXTEND
 0270    REF    3 LAST 621      26,3140   4 0077 0           DCS    A2CNTRAL
 0271    REF    1               26,3141   53'531 0           DXCH   FUNCTION       SAVE AS SGN(ALPHA)ALPHA(2)
 0272                           26,3142   0 0006 1           EXTEND
 0273    REF    4 LAST 621      26,3143   3 0066 1           DCA    OMEGA.K
 0274    REF    2 LAST 621      26,3144   21'531 0           DAS    FUNCTION       FORM FUNCT1

 0275    REF    3 LAST 621      26,3145   11'530 1           CCS    FUNCTION       DEL = SGN(FUNCT1)
 0276    REF    1               26,3146   1 3152 0           TCF    POSFNCT1
 0277                           26,3147   1 3151 0           TCF     +2
 0278    REF    1               26,3150   1 3154 0           TCF    NEGFNCT1

 0279    REF    4 LAST 621      26,3151   11'531 0           CCS    FUNCTION +1    USE LOW ORDER WORD SINCE HIGH IS ZERO
 0280    REF   86 LAST 619      26,3152   3 7656 0  POSFNCT1 CAF    TWO
 0281                           26,3153   1 3155 1           TCF     +2
 0282    REF  226 LAST 619      26,3154   3 7665 0  NEGFNCT1 CAF    ZERO
 0283    REF    8 LAST 585      26,3155   6 7667 1           AD     NEG1
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L       @TRIM GIMBAL CONTROL SYSTEM                                                USER'S OWN PAGE NO.    8

 0284   REF   1                26,3156  54 072 0              TS      DEL

 0285   REF   2 LAST 622       26,3157  10 072 0              CCS     DEL              MAKE OMEGA*K REALLY DEL*OMEGA*K
 0286   REF   1                26,3160  1 3165 1              TCF     FUNCT2           (NOTHING NEED BE DONE)
 0287                          26,3161   25253 1  .66667      DEC     .66667
 0288                          26,3162  0 0006 1              EXTEND
 0289   REF   5 LAST 621       26,3163  4 0066 0              DCS     OMEGA.K
 0290   REF   6 LAST 622       26,3164  52 066 0              DXCH    OMEGA.K          CHANGE SIGN OF OMEGA*K

 0291                          26,3165  0 0006 1  FUNCT2      EXTEND
 0292   REF   7 LAST 622       26,3166  3 0066 1              DCA     OMEGA.K
 0293   REF   5 LAST 621       26,3167  53'531 0              DXCH    FUNCTION         DEL*OMEGA*K
 0294                          26,3170  0 0006 1              EXTEND
 0295   REF   4 LAST 621       26,3171  3 0077 1              DCA     A2CNTRAL
 0296   REF   6 LAST 622       26,3172  21'531 0              DAS     FUNCTION         DEL*OMEGA*K + SGN(ALPHA)ALPHA(2)

 0297   REF   5 LAST 622       26,3173  30 076 0  FUNCT3      CAE     A2CNTRAL         CALCULATE (2/3)SGN(ALPHA)ALPHA(2)
 0298                          26,3174  0 0006 1              EXTEND
 0299   REF   1                26,3175  7 3161 0              MP      .66667
 0300   REF   6 LAST 622       26,3176  52 077 0              DXCH    A2CNTRAL
 0301   REF 219 LAST 616       26,3177  56 001 0              XCH     L
 0302                          26,3200  0 0006 1              EXTEND
 0303   REF   2 LAST 622       26,3201  7 3161 0              MP      .66667
 0304   REF   7 LAST 622       26,3202  26 077 0              ADS     A2CNTRAL +1
 0305   REF 220 LAST 622       26,3203  54 001 1              TS      L
 0306                          26,3204  1 3206 1              TCF      +2
 0307   REF   8 LAST 622       26,3205  6 0076 0              AD      A2CNTRAL

 0308   REF   8 LAST 622       26,3206  52 066 0              DXCH    OMEGA.K          DEL*OMEGA*K+
 0309   REF   9 LAST 622       26,3207  20 077 0              DAS     A2CNTRAL         (2/3)SGN(ALPHA)ALPHA(2)=G

 0310   REF  10 LAST 622       26,3210  30 076 0              CAE     A2CNTRAL         G*ALPHA IN D.P.
 0311                          26,3211  0 0006 1              EXTEND
 0312   REF   6 LAST 621       26,3212  7 0071 0              MP      ACENTRAL
 0313   REF  11 LAST 622       26,3213  52 077 0              DXCH    A2CNTRAL
 0314   REF 221 LAST 622       26,3214  56 001 0              XCH     L
 0315                          26,3215  0 0006 1              EXTEND
 0316   REF   7 LAST 622       26,3216  7 0071 0              MP      ACENTRAL
 0317   REF  12 LAST 622       26,3217  26 077 0              ADS     A2CNTRAL +1
 0318   REF 222 LAST 622       26,3220  54 001 1              TS      L
 0319                          26,3221  1 3223 0              TCF      +2
 0320   REF  13 LAST 622       26,3222  26 076 1              ADS     A2CNTRAL

 0321   REF  14 LAST 622       26,3223  52 077 0              DXCH    A2CNTRAL         FIRST AND THIRD TERMS
 0322   REF   4 LAST 621       26,3224  20 075 1              DAS     K2THETA          SUMMED IN D.P.

R0323   THE FOLLOWING SECTION CALCULATES .707*DEL*FUNCTION(3/2) AND ADDS IT TO THE OTHER TWO TERMS OF NEGUSUM.

 0325   REF   7 LAST 622       26,3225  11'530 1              CCS     FUNCTION         TEST FOR HIGH ORDER WORD NON-ZERO
 0326   REF   1                26,3226  1 3273 0              TCF     FMAGTEST         YES, SEE IF RESCALING IS NECESSARY
 0327                          26,3227   1 3231 0            TCF      +2              NO, USE LOW ORDER WORD ONLY
 0328                          26,3230    26501 1  .707GTS   DEC      .70711          (CCS HOLE USED FOR DATA)
 0329   REF  11 LAST 606       26,3231   0 4177 1            TC       T6JOBCHK

 0330   REF   8 LAST 622       26,3232   31'531 1            CAE      FUNCTION +1     USE LOW ORDER WORD ONLY
 0331   REF   2 LAST 590       26,3233   0 4275 0            TC       SPROOT          SQUARE ROOT SUBROUTINE CALL
 0332                          26,3234   0 0006 1            EXTEND                              3/2
 0333   REF   9 LAST 623       26,3235   7 1531 0            MP       FUNCTION +1     FUNCTION
 0334                          26,3236   0 0006 1            EXTEND                   (NEEDS TO BE SHIFTED RIGHT 21 PLACES)
 0335   REF  30 LAST 609       26,3237   7 7650 1            MP       BIT8
 0336   REF 223 LAST 622       26,3240   56 001 0            XCH      L
 0337   REF 227 LAST 621       26,3241   3 7665 0            CAF      ZERO                        3/2
 0338   REF  10 LAST 623       26,3242   53'531 0            DXCH     FUNCTION        SAVE FUNCTION    IN FUNCTION LOCATION
 0339   REF   1                26,3243   1 3260 1            TCF      DELTEST

 0340   REF  11 LAST 623       26,3244   31'530 0  SQRESCAL  CAE      FUNCTION        HIGH ORDER WORD OF FUNCTION NEEDS TO BE
 0341                          26,3245   0 0006 1            EXTEND                   RESCALED FOR ACCURACY, SO MULTIPLY D.P.
 0342   REF  38 LAST 619       26,3246   7 7651 0            MP       BIT7            VALUE BY 2(6)
 0343   REF  12 LAST 623       26,3247   23'530 0            LXCH     FUNCTION
 0344   REF 228 LAST 623       26,3250   3 7665 0            CAF      ZERO
 0345   REF  13 LAST 623       26,3251   57'531 1            XCH      FUNCTION +1
 0346                          26,3252   0 0006 1            EXTEND
 0347   REF  39 LAST 623       26,3253   7 7651 0            MP       BIT7
 0348   REF  14 LAST 623       26,3254   21'531 0            DAS      FUNCTION

 0349   REF 229 LAST 623       26,3255   3 7665 0            CAF      ZERO            SET FLAG TO GO TO RESCALE, AND GO TO DO
 0350   REF   1                26,3256   55'527 1            TS       MULTFLAG        SQUARE ROOT AND FUNCTION(3/2)
 0351   REF   1                26,3257   1 3300 0            TCF      DOSPROOT        CALCULATION

 0352   REF  37 LAST 586       26,3260   4 7637 0  DELTEST   CS       POSMAX          SET FLAG TO GO TO NEGUSUM
 0353   REF   2 LAST 623       26,3261   55'527 1            TS       MULTFLAG
 0354   REF   3 LAST 622       26,3262   10 072 0            CCS      DEL             GET DEL*.707
 0355   REF   1                26,3263   3 3230 0            CAF      .707GTS
 0356                          26,3264   1 3266 1            TCF       +2
 0357   REF   2 LAST 623       26,3265   4 3230 1            CS       .707GTS
 0358   REF   1                26,3266   1 3302 1            TCF      SPDPMULT        GO TO MULTIPLY ROUTINE

 0359   REF  38 LAST 623       26,3267   3 7637 1  RESHIFT   CAF      POSMAX          SET FLAG TO GO TO DELTEST
 0360   REF   3 LAST 623       26,3270   55'527 1            TS       MULTFLAG
 0361   REF  43 LAST 620       26,3271   3 7652 1            CAF      BIT6
 0362   REF   2 LAST 623       26,3272   1 3302 1            TCF      SPDPMULT        GO TO MULTIPLY ROUTINE

 0363   REF   2 LAST 124       26,3273   6 4362 1  FMAGTEST  AD       63/64+1         IF MAGNITUDE OF HIGH ORDER WORD IS LESS
 0364                          26,3274   54 000 0            OVSK                     THAN 1/64 RESCALE WHOLE D.P. WORD
 0365   REF   1                26,3275   1 3244 1            TCF      SQRESCAL

 0366   REF  39 LAST 623       26,3276   3 7637 1            CAF      POSMAX
 0367   REF   4 LAST 623       26,3277   55'527 1            TS       MULTFLAG

 0368   REF  15 LAST 623       26,3300   31'530 0  DOSPROOT  CAE      FUNCTION        USE HIGH ORDER WORD ONLY
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L       @TRIM GIMBAL CONTROL SYSTEM                                                            USER'S OWN PAGE NO.  10

 0369   REF   3 LAST 623     26,3301  0 4275 0            TC       SPROOT           SQUARE ROOT SUBROUTINE CALL

 0370   REF  16 LAST 623     26,3302  57'530 0  SPDPMULT  XCH      FUNCTION         THIS IS AN OPEN SUBROUTINE WHICH USES
 0371                        26,3303  0 0006 1            EXTEND                    MULTFLAG AS A RETURN SWITCH.
 0372   REF  17 LAST 624     26,3304  7 1530 1            MP       FUNCTION         IT MULTIPLIES FUNCTION (D.P.) BY C(A)
 0373   REF  18 LAST 624     26,3305  53'531 0            DXCH     FUNCTION         AND LEAVES THE RESULT IN FUNCTION (D.P.)
 0374                        26,3306  0 0006 1            EXTEND                    IT IS USED FOR-
 0375   REF 224 LAST 623     26,3307  7 0001 1            MP       L                1) F(1/2)*F
 0376   REF  19 LAST 624     26,3310  27'531 0            ADS      FUNCTION +1      2) (.707*DEL)*F
 0377   REF 225 LAST 624     26,3311  54 001 1            TS       L                3) 2(-9)*F
 0378                        26,3312  1 3314 0            TCF       +2
 0379   REF  20 LAST 624     26,3313  27'530 1            ADS      FUNCTION

 0380   REF   5 LAST 623     26,3314  11'527 1            CCS      MULTFLAG         POSMAX MEANS GO TO DELTEST
 0381   REF   2 LAST 623     26,3315  1 3260 1            TCF      DELTEST          ZERO   MEANS GO TO RESHIFT
 0382   REF   1              26,3316  1 3267 0            TCF      RESHIFT          NEGMAX MEANS GO TO NEGUSUM

 0383                        26,3317  0 0006 1  NEGUSUM   EXTEND                    FORM FINAL SUM FOR NEGUSUM
 0384   REF  21 LAST 624     26,3320  3 1531 1            DCA      FUNCTION
 0385   REF   5 LAST 622     26,3321  20 075 1            DAS      K2THETA

 0386   REF   6 LAST 624     26,3322  10 074 0            CCS      K2THETA          TEST FOR ZERO HIGH ORDER PART
 0387   REF   1              26,3323  1 3327 0            TCF      NEGDRIVE
 0388                        26,3324  1 3326 1            TCF       +2
 0389   REF   1              26,3325  1 3331 1            TCF      POSDRIVE

 0390   REF   7 LAST 624     26,3326  10 075 1            CCS      K2THETA +1       SIGN TEST ON LOW ORDER PART
 0391   REF  87 LAST 621     26,3327  3 7656 0  NEGDRIVE  CAF      TWO
 0392                        26,3330  1 3332 1            TCF       +2
 0393   REF 230 LAST 623     26,3331  3 7665 0  POSDRIVE  CAF      ZERO
 0394   REF   9 LAST 621     26,3332  6 7667 1            AD       NEG1
 0395   REF   3 LAST 609     26,3333  50 073 0            INDEX    ITEMP6           SET NEGUQ,R TO NEG DRIVE
 0396   REF   4 LAST 611     26,3334  55'532 0            TS       NEGUQ

 0397                        26,3335  4 0000 0            COM
 0398                        26,3336  0 0006 1            EXTEND                    SEND BACK JERK TERM
 0399   REF   4 LAST 624     26,3337  5 0073 0            INDEX    ITEMP6
 0400   REF   5 LAST 559     26,3340  7 1541 1            MP       ACCDOTQ
 0401   REF   5 LAST 624     26,3341  50 073 0            INDEX    ITEMP6
 0402   REF   1              26,3342  23'542 0            LXCH     QACCDOT

 0403   REF  27 LAST 619     26,3343  10 073 1            CCS      QRCNTR           LOOP COUNTER
 0404   REF   1              26,3344  1 2771 0            TCF      GOQTRIMG

R0405   TRANSFORM JERKS BACK TO GIMBAL AXES.

 0406   REF   2 LAST 624     26,3345  31'542 0            CAE      QACCDOT          SCALED AT PI/2(7)
 0407                        26,3346  0 0006 1            EXTEND
 0408   REF   4 LAST 576     26,3347  7 1400 0            MP       MR12             SCALED AT 2
 0409   REF   3 LAST 611     26,3350  55'576 0            TS       Y3DOT
 0410   REF   1              26,3351  31'544 0            CAE     RACCDOT       SCALED AT PI/2(7)
 0411                        26,3352  0 0006 1            EXTEND
 0412   REF   3 LAST 576     26,3353  7 1402 1            MP      MR13          SCALED AT 2
 0413   REF   4 LAST 624     26,3354  27'576 0            ADS     Y3DOT
 0414   REF   5 LAST 625     26,3355  27'576 0            ADS     Y3DOT         SCALED AT PI/2(7)

 0415   REF   3 LAST 624     26,3356  31'542 0            CAE     QACCDOT       SCALED AT PI/2(7)
 0416                        26,3357  0 0006 1            EXTEND
 0417   REF   2 LAST 535     26,3360  7 1401 1            MP      MR22          SCALED AT 1
 0418   REF   2 LAST 611     26,3361  55'600 1            TS      Z3DOT
 0419   REF   2 LAST 625     26,3362  31'544 0            CAE     RACCDOT       SCALED AT PI/2(7)
 0420                        26,3363  0 0006 1            EXTEND
 0421   REF   2 LAST 535     26,3364  7 1403 0            MP      MR23          SCALED AT 1
 0422   REF   3 LAST 625     26,3365  27'600 1            ADS     Z3DOT         SCALED AT PI/2(7)

 0423   REF   2 LAST 618     26,3366  0 3400 0            TC      WRCHN12       SEND GIMBAL DRIVES TO SERVOS
 0424   REF  39 LAST 616     26,3367  1 4606 1            TCF     RESUME        WAIT UNTIL NEXT TRIM GIMBAL RUPT

R0425   WAITLIST TASKS TO SET TRIM GIMBAL TURN OFF BITS.

 0426   REF 231 LAST 624     26,3370  3 7665 0  OFFGIMQ   CAF     ZERO          SET Q-AXIS FLAG TO ZERO
 0427   REF   5 LAST 624     26,3371  55'532 0            TS      NEGUQ
 0428                        26,3372  1 3375 1            TCF      +3
 0429   REF 232 LAST 625     26,3373  3 7665 0  OFFGIMR   CAF     ZERO          SET R-AXIS FLAG TO ZERO
 0430   REF   2 LAST 611     26,3374  55'534 0            TS      NEGUR
 0431   REF   3 LAST 625     26,3375  0 3400 0            TC      WRCHN12       FLAGS TO CHANNEL BITS
 0432   REF  67 LAST 618     26,3376  1 4602 0            TCF     TASKOVER

R0433   THE WRCHN12 SUBROUTINE SETS BITS 9,10,11,12 OF CHANNEL 12 ON THE BASIS OF THE CONTENTS OF NEGUQ,NEGUR WHICH ARE
R0435   THE NEGATIVES OF THE TRIM GIMBAL DESIRED DRIVES.

 0436                        26,3377   07400 1  BGIM      OCTAL   07400
 0437   REF   6 LAST 624                 0073   CHNL12    EQUALS  ITEMP6

 0438   REF   1              26,3400  4 3377 0  WRCHN12   CS      BGIM          SAVE THE REST OF CHANNEL 12 DURING TESTS
 0439                        26,3401  0 0006 1            EXTEND
 0440                        26,3402  02 012 0            RAND    12
 0441   REF   1              26,3403  54 073 1            TS      CHNL12        (TEMPORARY STORAGE)

 0442   REF   6 LAST 625     26,3404  11'532 0            CCS     NEGUQ
 0443   REF  27 LAST 608     26,3405  3 7647 0            CAF     BIT9
 0444                        26,3406  1 3410 0            TCF      +2
 0445   REF  48 LAST 620     26,3407  3 7646 1            CAF     BIT10
 0446   REF   2 LAST 625     26,3410  26 073 1            ADS     CHNL12

 0447   REF   3 LAST 625     26,3411  11'534 0            CCS     NEGUR
 0448   REF  30 LAST 607     26,3412  3 7645 1            CAF     BIT11
 0449                        26,3413  1 3415 0            TCF      +2
 0450   REF  22 LAST 619     26,3414  3 7644 0            CAF     BIT12
 0451   REF   3 LAST 625     26,3415  26 073 1            ADS     CHNL12        (STORED RESULT NOT USED AT PRESENT)
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L       @TRIM GIMBAL CONTROL SYSTEM                                                    USER'S OWN PAGE NO.  12

 0452                          26,3416  0 0006 1             EXTEND
 0453                          26,3417  01 012 0             WRITE  12

 0454   REF 292 LAST 610       26,3420  0 0002 0             TC     Q                  SIMPLE RETURN ALWAYS

R0455   Q,R-TRANSF TRANSFORMS A Y,Z GIMBAL COORDINATE VARIABLE PAIR (IN A,L) TO PILOT COORDINATES (Q/R), RETURNED IN A.
R0457   (THE MATRIX M FROM GIMBAL TO PILOT AXES IS ASSUMED TO BE DONE BY T4RUPT AND SCALED AT +1.)

 0459   REF   7 LAST 625                 0073  QRERAS        EQUALS ITEMP6

 0460   REF   1                26,3421  22 073 0  QTRANSF    LXCH   QRERAS             SAVE Z-AXIS VARIABLE
 0461                          26,3422  0 0006 1             EXTEND
 0462   REF   4 LAST 576       26,3423  7 1405 0             MP     M21                (Y-AXIS)*M21
 0463   REF   2 LAST 626       26,3424  56 073 0             XCH    QRERAS             SAVE, GET Z-AXIS VARIABLE
 0464                          26,3425  0 0006 1             EXTEND
 0465   REF   7 LAST 577       26,3426  7 1401 1             MP     M22                (Z-AXIS)*M22
 0466   REF   3 LAST 626       26,3427  6 0073 0             AD     QRERAS             SUM = (Y-AXIS)*M21 + (Z-AXIS)*M22
 0467   REF 293 LAST 626       26,3430  0 0002 0             TC     Q                  RETURN WITH SUM IN A

 0468   REF   4 LAST 626       26,3431  22 073 0  RTRANSF    LXCH   QRERAS             SAVE Z-AXIS VARIABLE
 0469                          26,3432  0 0006 1             EXTEND
 0470   REF   4 LAST 577       26,3433  7 1406 0             MP     M31                (Y-AXIS)*M31
 0471   REF   5 LAST 626       26,3434  56 073 0             XCH    QRERAS             SAVE, GET Z-AXIS VARIABLE
 0472                          26,3435  0 0006 1             EXTEND
 0473   REF   6 LAST 577       26,3436  7 1403 0             MP     M32                (Z-AXIS)*M32
 0474   REF   6 LAST 626       26,3437  6 0073 0             AD     QRERAS             SUM = (Y-AXIS)*M31 + (Z-AXIS)*M32
 0475   REF 294 LAST 626       26,3440  0 0002 0             TC     Q                  RETURN WITH SUM IN A

 0476                          26,3441   25253 1  (2/3)      DEC    0.66667
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P0478   SUBROUTINE: TGOFFCAL              MOD. NO. 1  DATE: AUGUST 22, 1966

R0479   PROGRAM DESIGN BY: RICHARD D. GOSS (MIT/IL)

R0480   PROGRAM IMPLEMENTATION BY: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0481   THIS SUBROUTINE CALCULATES THE TRIM GIMBAL SHUTDOWN TIME FOR EITHER THE Q OR THE R AXIS (DEPENDING ON THE
R0483   CALLING SEQUENCE).  THIS TIME IS SCALED FOR IMMEDIATE USE BY A WAITLIST CALL AS SHOWN IN THE CALLING SEQUENCES.
R0485   IF THE TIME-TO-GO IS MORE THAN TWO MINUTES, IT IS LIMITED TO TWO MINUTES DUE TO THE WAITLIST SPECIFICATION.  IF
R0487   THE TIME-TO-GO IS LESS THAN TEN MILLISECONDS, THE SHUTDOWN IS PERFORMED IMMEDIATELY AND THE WAITLIST CALL IS
R0489   BY-PASSED.  FINALLY, IF THE TRIM GIMBAL SHOULD HAPPEN TO BE MOVING IN A DIRECTION WHICH INCREASES THE ANGULAR
R0491   ACCELERATION ABOUT THE GIVEN AXIS, THEN THE NEGATIVE GIMBAL DRIVE FLAG IS IMMEDIATELY COMPLEMENTED AND THE
R0493   NORMAL CALCULATIONS ARE RESUMED.

R0494   THESE TIME-TO-GO CALCULATIONS ARE DESIGNED TO DRIVE THE TRIM GIMBAL TO A POSITION WHERE THE DESCENT ENGINE WILL
R0496   CAUSE NO ANGULAR ACCELERATION.  THIS SUBROUTINE IS CALLED ONLY FROM THE WAITLIST TASK CHEKDRIV WHICH IS
R0498   INITIATED ONLY WHEN THE TRIM GIMBAL CONTROL LAW HAS LOST CONTROL OF THE LEM VEHICLE ATTITUDE AND MUST RETURN TO
R0500   THE USE OF REACTION CONTROL SYSTEM JETS.

R0501   CALLING SEQUENCES:

R0502                           26,1000  3 7657 1          CAF     ZERO              Q-AXIS INDEXER
R0504                           26,1001  0 $$$$ $          TC      TGOFFCAL          CALL TGOFFCAL (*** REPLACE $S ***)
R0506                           26,1002  0 4511 0          TC      WAITLIST          CALL WAITLIST WITH CALCULATED TIME
R0508                           26,1003   0$$$$ $          2CADR   OFFGIMQ           2CADR OF Q-AXIS SHUTDOWN PROGRAM
R0510                           26,1004   54006 1

R0511                           26,1005  3 7657 1          CAF     TWO               R-AXIS INDEXER
R0513                           26,1006  0 $$$$ $          TC      TGOFFCAL          CALL TGOFFCAL (*** REPLACE $S ***)
R0515                           26,1007  0 4511 0          TC      WAITLIST          CALL WAITLIST WITH CALCULATED TIME
R0517                           26,1010   0$$$$ $          2CADR   OFFGIMR           2CADR OF R-AXIS SHUTDOWN PROGRAM
R0519                           26,1011   54006 1

R0520   SUBROUTINES CALLED: NONE, BUT WRCHNL12 IS CALLED AFTER BOTH TGOFFCALL CALLS.

R0522   NORMAL EXITS: TO WAITLIST CALL OR BEYOND 2CADR IN CALLING SEQUENCE AS SPECIFIED ABOVE.

R0524   ALARM OR ABORT EXIT MODES: NONE

R0525   INPUT: 1. THE AXIS INDEXER: 0 FOR Q, 2 FOR R (SEE CALLING SEQUENCES)
R0526          2. THE SIGNED TIME DERIVATIVE OF ACCELERATION (QACCDOT OR RACCDOT) SCALED AT PI/2(7) RAD/SEC(3).
R0528          3. THE ACCELERATION APPROXIMATION FROM THE DESCENT KALMAN FILTER TRANSFORMED TO PILOT AXES (ALPHAQ OR
R0530   ALPHAR) SCALED AT PI/8 RAD/SEC(2).
R0531          4. THE NEGATIVE GIMBAL DRIVE FLAG (NEGUQ AND NEGUR) WHERE +1 BIT INDICATES A GIMBAL DRIVE DIRECTION WHICH
R0533   DECREASES THE SIGNED GIMBAL ANGLE, WHERE -1 BIT INDICATES A GIMBAL DRIVE DIRECTION WHICH INCREASES THE SIGNED
R0535   GIMBAL ANGLE, AND WHERE ZERO INDICATES NO DRIVE.
R0536          5. CHANNEL 12 CONTAINS THE TRIM GIMBAL DRIVES AND OTHER BITS.

R0537   ERASABLE STORAGE CONFIGURATION (NEEDED BY THE INDEXING METHODS):
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A0538                                                        NEGUQ     ERASE    +2               NEGATIVE OF Q-AXIS GIMBAL DRIVE
A0539                                                        (SPWORD)  EQUALS NEGUQ +1           ANY S.P. ERASABLE NUMBER, NOW THRSTCMD
A0540                                                        NEGUR     EQUALS NEGUQ +2           NEGATIVE OF R-AXIS GIMBAL DRIVE

A0541                                                        QACCDOT   ERASE    +2               Q-JERK SCALED AT PI/2(7) RAD/SEC(3) +SGN
A0542                                                        (SPWORD)  EQUALS QACCDOT +1         ANY S.P. ERASABLE NUMBER, NOW ACCDOTR
A0543                                                        RACCDOT   EQUALS QACCDOT +2         R-JERK SCALED AT PI/2(7) RAD/SEC(3) +SGN
A0544                                                                                            NOTE: NOW ACCDOTQ MUST PRECEDE QACCDOT

A0545                                                        ALPHAQ    ERASE    +2               Q-AXIS ACCELERATION SCALED AT PI/8 R/S2
A0546                                                        (SPWORD)  EQUALS ALPHAQ +1          ANY S.P. ERASABLE NUMBER, NOW OMEGAR
A0547                                                        ALPHAR    EQUALS ALPHAQ +2          R-AXIS ACCELERATION SCALED AT PI/8 R/S2
A0548                                                                                            NOTE: NOW OMEGAP,OMEGAQ PRECEDE ALPHAQ

R0549   DEBRIS: L, Q, ITEMP1, ITEMP2, ITEMP6


 0550   REF    1                26,3442  54 065 0  TGOFFCAL TS       QRNDXER                  Q OR R AXIS INDEXER
 0551   REF    2 LAST 628       26,3443  50 065 1           INDEX    QRNDXER                  GET SIGNED JERK TERM SCALED AT PI/2(7)
 0552   REF    4 LAST 625       26,3444  31'542 0           CAE      QACCDOT                  IN RADIANS/SECOND(3)
 0553                           26,3445  0 0006 1           EXTEND                            IF THETA TRIPLE-DOT IS ZERO, THEN RESET
 0554   REF    1                26,3446  1 3511 0           BZF      TGOFFNOW                 DRIVE TO ZERO (SHOULD BE REDUNDANT)
 0555   REF    1                26,3447  54 066 0           TS       NZACCDOT                 SAVE NON-ZERO JERK FOR DENOMINATOR
 0556                           26,3450  0 0006 1           EXTEND                            TEST FOR REDUCING ACCELERATION IS SAME
 0557   REF    3 LAST 628       26,3451  5 0065 1           INDEX    QRNDXER                  AS TEST FOR SAME SIGN IN -ACC AND ACCDOT
 0558   REF    3 LAST 616       26,3452  7 1420 1           MP       ALPHAQ                   IF POSITIVE PRODUCT, THEN GIMBAL DRIVE
 0559   REF  369 LAST 617       26,3453  10 000 0           CCS      A                        SHOULD BE REVERSED: NOTE THAT A SIMPLE
 0560   REF    1                26,3454  1 3460 1           TCF      NEGTIME                  BZMF TEST WILL NOT WORK WHEN THE MP
 0561   REF    2 LAST 628       26,3455  1 3460 1           TCF      NEGTIME                  INSTRUCTION RESULTS IN ZERO IN A
 0562   REF    1                26,3456  1 3466 1           TCF      POSTIME                  AT POSTIME IT IS INSURED THAT A POSITIVE
 0563   REF    2 LAST 628       26,3457  1 3466 1           TCF      POSTIME                  TIME WILL RESULT AND ACC WILL GO TO ZERO

 0564   REF    4 LAST 628       26,3460  50 065 1  NEGTIME  INDEX    QRNDXER                  COMPLEMENT THE DRIVE DIRECTION FLAG
 0565   REF    7 LAST 625       26,3461  4 1532 0           CS       NEGUQ
 0566   REF    5 LAST 628       26,3462  50 065 1           INDEX    QRNDXER
 0567   REF    8 LAST 628       26,3463  55'532 0           TS       NEGUQ
 0568   REF    2 LAST 628       26,3464  4 0066 0           CS       NZACCDOT                 COMPLEMENT ACCDOT TO GET A GUARANTEED
 0569   REF    3 LAST 628       26,3465  54 066 0           TS       NZACCDOT                 POSITIVE TIME FROM QUOTIENT

 0570   REF    6 LAST 628       26,3466  50 065 1  POSTIME  INDEX    QRNDXER                  TIME = -ACC/ACCDOT (POSITIVE VALUE)
 0571   REF    4 LAST 628       26,3467  4 1420 1           CS       ALPHAQ                   SCALED AT PI/8 RADIANS/SECOND(2)
 0572                           26,3470  0 0006 1           EXTEND                            MULTIPLY BY 1/16
 0573   REF   31 LAST 625       26,3471  7 7645 0           MP       BIT11                    TO CHANGE SCALING TO 2PI RAD/SEC(2)
 0574                           26,3472  0 0006 1           EXTEND                            ACCDOT SCALED AT PI/2(7) IN DENOMINATOR
 0575   REF    4 LAST 628       26,3473  10 066 0           DV       NZACCDOT                 YIELDS TIME SCALED AT 256 SECONDS
 0576   REF    1                26,3474  6 3517 1           AD       -2MIN256                 COMPARE WITH MAXIMUM 2 MINUTE DELAY OF
 0577   REF  370 LAST 628       26,3475  10 000 0           CCS      A                        WAITLIST ACTION (TIMES AT 256 SECONDS)
 0578   REF    1                26,3476  4 3516 1           CS       -2MINWL                  MORE THAN TWO MINUTES, USE 2 MINUTES
 0579   REF  295 LAST 626       26,3477  0 0002 0           TC       Q                        RETURN WL CALL WITH 2 MIN AT 1BIT=10MS
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0580  REF 158 LAST 618   26,3500  6 7657 1           AD      ONE        (CORRECT FOR CCS BIT)
0581                     26,3501  0 0006 1           EXTEND             CALCULATE DT = ABS(T-2MIN)
0582  REF   1            26,3502  7 3520 1           MP      128/164    AND RESCALE DT TO WAITLIST SCALING
0583                     26,3503  20 001 1           DDOUBL
0584  REF   2 LAST 628   26,3504  6 3516 0           AD      -2MINWL    -T = DT + 2MIN (IN WAITLIST SCALING)
0585                     26,3505  4 0000 0           COM                MAKE T POSITIVE FOR WAITLIST
0586                     26,3506  0 0006 1           EXTEND             MAKE FINAL CHECK TO INSURE T .G. 10 MS
0587  REF   2 LAST 628   26,3507  6 3511 1           BZMF    TGOFFNOW   DO SHUTDOWN NOW (COULD USE BZF)
0588  REF 296 LAST 628   26,3510  0 0002 0           TC      Q          RETURN TO WAITLIST CALL WITH WL TIME

0589  REF 233 LAST 625   26,3511  3 7665 0  TGOFFNOW CAF     ZERO       MAKE SURE PLUS ZERO FOR DRIVE FLAG
0590  REF   7 LAST 628   26,3512  50 065 1           INDEX   QRNDXER    TURN OFF DRIVE FLAG NOW
0591  REF   9 LAST 628   26,3513  55'532 0           TS      NEGUQ
0592  REF 297 LAST 629   26,3514  50 002 0           INDEX   Q
0593                     26,3515  0 0003 1           TC      3          SKIP WAITLIST CALL AND 2CADR


0594  REF  89 LAST 577              0065  QRNDXER  EQUALS  ITEMP1     INDEXER FOR Q OR R AXIS
0595  REF  30 LAST 577              0066  NZACCDOT EQUALS  ITEMP2     TEMPORARY STORAGE FOR NON-ZERO ACCDOT
0596                     26,3516  50437 1  -2MINWL  DEC     -12000     - 2 MINUTES SCALED FOR WAITLIST
0597                     26,3517  60777 0  -2MIN256 DEC     -.46875    - 2 MINUTES SCALED AT 256
0598                     26,3520  31000 0  128/164  OCTAL   31000      128/163.84 CONVERTING 256 TO WAITLIST/2
0599                            26,3521  ENDDAP26 EQUALS
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L        AOSTASK                                                                     USER'S OWN PAGE NO.   1
 0001                                  25,3064                    BANK     25
 0002    REF   4 LAST 540                   E6                    EBANK=  AOSQ

 0003    REF  31 LAST 623     25,3064  3 7650 0  AOSTASK  CAF      BIT8              TEST POWERED ASCENT FLAG (BIT8/DAPBOOLS)
 0004    REF  42 LAST 617     25,3065  7 0765 1           MASK     DAPBOOLS          0- NOT POWERED ASCENT
 0005                         25,3066  0 0006 1           EXTEND                     1- POWERED ASCENT
 0006    REF   1              25,3067  1 3325 1           BZF      COASTASC          END CYCLE OF TASKS DURING ASCENT COAST

 0007    REF   2 LAST 187     25,3070  31'671 0           CAE      KCOEFCTR          TEST KCOEFCTR FOR INITIAL PASS
 0008                         25,3071  0 0006 1           EXTEND
 0009    REF   1              25,3072  1 3275 0           BZF      ZEROCOEF          DISCONTINUITY SECTION FOR COEFFA

 0010    REF   1              25,3073  6 3367 0           AD       DEC-399           TEST KCOEFCTR FOR CONSTANT RANGE
 0011                         25,3074  0 0006 1           EXTEND                     ON BOTH K AND COEFFA
 0012                         25,3075  6 3077 1           BZMF      +2
 00121   REF   1              25,3076  1 3301 1           TCF      KONENOW

 001215  REF   1              25,3077  3 3410 1           CAF      0.00125           COEFFA = 0.00125(T) + 0.25
 00122                        25,3100  0 0006 1           EXTEND
 00123   REF   3 LAST 630     25,3101  7 1671 1           MP       KCOEFCTR
 00124   REF  28 LAST 620     25,3102  3 7643 1           CAF      BIT13
 00125   REF 226 LAST 624     25,3103  6 0001 0           AD       L
 00126   REF  31 LAST 629     25,3104  54 066 0  COEFFA   TS       ITEMP2

 0013    REF   1              25,3105  3 3411 0           CAF      0.0014            K = 0.0014(T) + 0.44
 0014                         25,3106  0 0006 1           EXTEND
 0015    REF   4 LAST 630     25,3107  7 1671 1           MP       KCOEFCTR
 0016    REF   1              25,3110  3 3412 0           CAF      0.44
 0017    REF 227 LAST 630     25,3111  6 0001 0           AD       L
 0018    REF  90 LAST 629     25,3112  54 065 0           TS       ITEMP1
 0019                         25,3113  4 0000 0           COM                        (1-K),QR SCALED AT 1
 0020    REF  40 LAST 623     25,3114  6 7637 1           AD       POSMAX            (1 BIT ERROR DOES NOT COMPOUND)
 0022    REF   4 LAST 563     25,3115  55'657 0           TS       (1-K)QR

 0023                         25,3116  0 0006 1           EXTEND                     (1-K)/8 IS (1-K) SCALED AT 8
 0024    REF  23 LAST 625     25,3117  7 7644 1           MP       BIT12
 0025    REF   2 LAST 564     25,3120  55'660 1           TS       (1-K)/8

 00251   REF  91 LAST 630     25,3121  30 065 1           CAE      ITEMP1            WFORQR = K/DT SCALED AT 16
 00252                        25,3122  0 0006 1           EXTEND
 00253   REF   1              25,3123  7 3403 1           MP       10AT16WL          DT = .1 SECS
 00254   REF   6 LAST 564     25,3124  55'656 1           TS       WFORQR

 0026    REF  92 LAST 630     25,3125  4 0065 0           CS       ITEMP1            FORM (.1-.05K) FROM K SCALED AT 1
 0027                         25,3126  0 0006 1           EXTEND                     WHICH IS USED AS IS BUT SINCE THE SUM
 0028    REF   1              25,3127  7 3375 1           MP       .05AT.5           IS TO BE SCALED AT 1/2, THE TWO
 0029    REF   1              25,3130  6 3376 0           AD       .1AT.5            CONSTANTS REFLECT THAT SCALE FACTOR
 0030    REF  93 LAST 630     25,3131  54 065 0           TS       ITEMP1

 0040    REF  32 LAST 630     25,3132  30 066 1  COEFFA1  CAE      ITEMP2            FORM COEFFA(AOSQ)
 0041                         25,3133  0 0006 1           EXTEND
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L       AOSTASK                                                                     USER'S OWN PAGE NO.   2

 0042   REF   5 LAST 630     25,3134  7 1634 0          MP      AOSQ
 0043   REF   6 LAST 631     25,3135  55'634 0          TS      AOSQ          FIRST TERM OF NEW AOSQ, SCALED AT PI/2

 0044   REF  33 LAST 630     25,3136  30 066 1          CAE     ITEMP2        FORM COEFFA(AOSR)
 0045                        25,3137  0 0006 1          EXTEND
 0046   REF   1              25,3140  7 1635 1          MP      AOSR
 0047   REF   2 LAST 631     25,3141  55'635 1          TS      AOSR          FIRST TERM OF NEW AOSR, SCALED AT PI/2

 0048   REF  34 LAST 631     25,3142  4 0066 0          CS      ITEMP2        FORM .5(1-COEFFA) SCALED AT 2
 00481                       25,3143  0 0006 1          EXTEND                FROM COEFFA SCALED AT 1 WHICH IS THE
 00482  REF  29 LAST 630     25,3144  7 7643 0          MP      BIT13         SAME AS 2(COEFFA) SCALED AT 2
 0049   REF  30 LAST 631     25,3145  6 7643 1          AD      BIT13         SO MULTIPLY BY 1/4 TO GET .5(COEFFA)
 0050   REF  35 LAST 631     25,3146  54 066 0          TS      ITEMP2        AND 1/4 IS 1/2 WHEN SCALED AT 2

 0051   REF  17 LAST 619     25,3147  4 1417 0          CS      OMEGAQ        SAVE PRESENT OMEGAQ FOR NEXT PASS
 0052   REF   3 LAST 540     25,3150  57'644 0          XCH     OLDWFORQ      GET -(LAST OMEGAQ)
 0053                        25,3151  0 0006 1          EXTEND
 0054   REF   5 LAST 571     25,3152  61'640 1          SU      SUMRATEQ      FORM- W - W(OLD) - SUMRATE = SUM
 0055   REF  18 LAST 631     25,3153  6 1417 1          AD      OMEGAQ        SCALED AT PI/4 RADIANS/SECOND
 0056                        25,3154  0 0006 1          EXTEND
 0057   REF  36 LAST 631     25,3155  7 0066 0          MP      ITEMP2        AOSQ = COEFFA(AOSQ)+.5(1-COEFFA)(SUM)
 0058   REF   7 LAST 631     25,3156  27'634 0          ADS     AOSQ          SCALED AT PI/2 RADIANS/SECOND(2)

 0059   REF  15 LAST 616     25,3157  4 1421 0          CS      OMEGAR        SAVE PRESENT OMEGAQ FOR NEXT PASS
 0060   REF   2 LAST 187     25,3160  57'645 1          XCH     OLDWFORR      GET -(LAST OMEGAR)
 0061                        25,3161  0 0006 1          EXTEND
 0062   REF   4 LAST 571     25,3162  61'641 0          SU      SUMRATER      FORM- W - W(OLD) - SUMRATE = SUM
 0063   REF  16 LAST 631     25,3163  6 1421 1          AD      OMEGAR        SCALED AT PI/4 RADIANS/SECOND
 0064                        25,3164  0 0006 1          EXTEND
 0065   REF  37 LAST 631     25,3165  7 0066 0          MP      ITEMP2        AOSR = COEFFA(AOSR)+.5(1-COEFFA)(SUM)
 0066   REF   3 LAST 631     25,3166  27'635 1          ADS     AOSR          SCALED AT PI/2 RADIANS/SECOND(2)

 00661  REF  94 LAST 630     25,3167  30 065 1          CAE     ITEMP1
 00662                       25,3170  0 0006 1          EXTEND                FORM TERM FOR RATE DERIVATION
 00663  REF   8 LAST 631     25,3171  7 1634 0          MP      AOSQ          (.1-.05K)AOSQ
 00664  REF   5 LAST 563     25,3172  55'642 1          TS      AOSQTERM      SCALED AT PI/4 RADIANS/SECOND

 0067   REF  95 LAST 631     25,3173  30 065 1          CAE     ITEMP1
 0068                        25,3174  0 0006 1          EXTEND                FORM TERM FOR RATE DERIVATION
 0069   REF   4 LAST 631     25,3175  7 1635 1          MP      AOSR          (.1-.05K)AOSR
 0070   REF   4 LAST 563     25,3176  55'643 0          TS      AOSRTERM      SCALED AT PI/4 RADIANS/SECOND

 0071   REF   9 LAST 631     25,3177  31'634 1          CAE     AOSQ          FORM AOS FOR U-AXIS
 0072   REF   5 LAST 631     25,3200  6 1635 0          AD      AOSR
 0073                        25,3201  0 0006 1          EXTEND
 0074   REF   1              25,3202  7 3377 0          MP      .707WL
 0075   REF   1              25,3203  55'636 1          TS      AOSU          SCALED AT PI/2 RADIANS/SECOND(2)

 0076   REF  10 LAST 631     25,3204  4 1634 0          CS      AOSQ          FORM AOS FOR V-AXIS
 0077   REF   6 LAST 631     25,3205  6 1635 0          AD      AOSR
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0078                          25,3206  0 0006 1            EXTEND
0079    REF   2 LAST 631      25,3207  7 3377 0            MP       .707WL
0080    REF   1               25,3210  55'637 0            TS       AOSV         SCALED AT PI/2 RADIANS/SECOND(2)

0081    REF  27 LAST 605      25,3211  3 6165 0            CAF      THREE        SET UP LOOP FOR Q,R,U,V-AXES
0082    REF   1               25,3212  54 065 0            TS       AXISCNTR

0083    REF   2 LAST 632      25,3213  50 065 1  ALLAXES   INDEX    AXISCNTR
0084    REF  11 LAST 631      25,3214  11'634 0            CCS      AOSQ         FORM ABSOLUTE VALUE OF AOS
0085    REF 159 LAST 629      25,3215  6 7657 1            AD       ONE
0086                          25,3216  1 3220 0            TCF       +2
0087    REF 160 LAST 632      25,3217  6 7657 1            AD       ONE
0088    REF   3 LAST 632      25,3220  50 065 1            INDEX    AXISCNTR     SAVE IN ITEMP REGISTER (3-6)
0089    REF   4 LAST 540      25,3221  54 070 1            TS       ABVLAOSQ     SCALED AT PI/2 RADIANS/SECOND(2)
0090    REF   1               25,3222  6 3400 0            AD       -.02R/S2     -.02 RADIANS/SECOND(2) SCALED AT PI/2
0091                          25,3223  0 0006 1            EXTEND
0092    REF   1               25,3224  6 3263 0            BZMF     CONSTMIN     USE 1/(.02) SEC(2)/RAD AS 1/AMIN
00955   REF   1               25,3225  6 3413 1            AD       +.02R/S2
0096    REF  38 LAST 631      25,3226  54 066 0            TS       ITEMP2
0098    REF  40 LAST 623      25,3227  3 7651 1            CAF      BIT7
0099                          25,3230  22 007 0            ZL                    SCALE FACTOR FOR .5ACCMIN.
00995                         25,3231  0 0006 1            EXTEND
0100    REF  39 LAST 632      25,3232  10 066 0            DV       ITEMP2
0101    REF   4 LAST 632      25,3233  50 065 1  ACCMINVL  INDEX    AXISCNTR
0102    REF   4 LAST 583      25,3234  55'651 0            TS       .5ACCMNQ     SCALED AT 2(+8)/PI

0103    REF   2 LAST 632      25,3235  3 3400 0            CAF      -.02R/S2     CALCULATE ONE OF THE FOLLOWING (4) SUMS:
0104                          25,3236  0 0006 1            EXTEND                2JETAC(Q,R)-ABAOS(Q,R)-.02RAD/SEC(2) OR
0105    REF   5 LAST 632      25,3237  5 0065 1            INDEX    AXISCNTR     1JETAC(U,V)-ABAOS(1,V)-.02RAD/SEC(2)
0106    REF   5 LAST 632      25,3240  60 070 0            SU       ABVLAOSQ     EACH SUM HAS EACH TERM SCALED AT PI/2
0107    REF   6 LAST 632      25,3241  50 065 1            INDEX    AXISCNTR     THE "OUTER LOOP" IS DEFINED TO CALCULATE
0108    REF   3 LAST 571      25,3242  6 1630 0            AD       1JACCQ       THE VALUES 1JACCQ, 1JACCR SCALED AT PI/4
0109                          25,3243  0 0006 1            EXTEND                AND 1JACCU, 1JACCV SCALED AT PI/2 WHERE
0110    REF   1               25,3244  6 3265 0            BZMF     DEMANDAC     1JACCU = 2(.707)(1JACCQ+1JACCR) AND
0111    REF 234 LAST 629      25,3245  3 7665 0            CAF      ZERO         1JACCV = 2(.707)(1JACCQ+1JACCR)
0112    REF   7 LAST 632      25,3246  50 065 1            INDEX    AXISCNTR     WHERE THE CALCULATIONS USE THE FACT THAT
0113    REF   6 LAST 583      25,3247  55'665 1            TS       QMANDACC     1JACC(Q,R) AT PI/4 = 2JACC(Q,R) AT PI/2
0114    REF   8 LAST 632      25,3250  50 065 1            INDEX    AXISCNTR     MANDACC(Q,R)=1 MEANS USE 4 JETS, 0 FOR 2
0115    REF   5 LAST 583      25,3251  31'445 0            CAE      1/2JTSQ      MANDACC(U,V)=1 MEANS USE 2 JETS, 0 FOR 1
01151                         25,3252  0 0006 1            EXTEND
01152   REF  47 LAST 619      25,3253  7 7642 1            MP       BIT14
0116    REF   9 LAST 632      25,3254  50 065 1  AXISLOOP  INDEX    AXISCNTR     SET UP 1/NJTSX TO 1/2JTSX FOR URGENCY
0117    REF   5 LAST 578      25,3255  55'661 0            TS       1/NJTSQ      (DOES NOT COUNT FOR U,V-AXES)

0118    REF  10 LAST 632      25,3256  10 065 0            CCS      AXISCNTR     DECREMENT LOOP COUNTER AND TEST FOR END
0119                          25,3257  1 3261 0            TCF       +2
0120    REF   1               25,3260  1 3313 1            TCF      NEXTCALL     FINISHED LOOP

0121    REF  11 LAST 632      25,3261  54 065 0            TS       AXISCNTR
0122    REF   1               25,3262  1 3213 0            TCF      ALLAXES      CONTINUE LOOP
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L         AOSTASK                                                                              USER'S OWN PAGE NO.   4

 0123    REF    1            25,3263  3 3402 1  CONSTMIN CAF      AMINCNST          1/AMIN = 1/(.02) SEC(2)/RAD AT 2(8)/PI
 0124    REF    1            25,3264  1 3233 1           TCF      ACCMINVL

 0125    REF   41 LAST 630   25,3265  3 7637 1  DEMANDAC CAF      POSMAX            SET MANDATORY HIGH ACCELERATION FLAG TO
 0126    REF   12 LAST 632   25,3266  50 065 1           INDEX    AXISCNTR          OVER-RIDE 2 JET DECISION FOR Q,R-AXES OR
 0127    REF    7 LAST 632   25,3267  55'665 1           TS       QMANDACC          2 JET OPTIONAL DECISION FOR U,V-AXES
 0128    REF   13 LAST 633   25,3270  50 065 1           INDEX    AXISCNTR          FORM 1/4JTSX VALUE FOR USE IN URGENCY
 0129    REF    6 LAST 632   25,3271  31'445 0           CAE      1/2JTSQ           FROM 1/2JTSX
 0130                        25,3272  0 0006 1           EXTEND                     (DOES NOT COUNT FOR U,V-AXES)
 0131    REF   31 LAST 631   25,3273  7 7643 0           MP       BIT13
 0134    REF    1            25,3274  1 3254 0           TCF      AXISLOOP

 0135    REF   88 LAST 624   25,3275  3 7656 0  ZEROCOEF CAF      TWO               INITIALIZE TIME SETTING
 01351   REF    5 LAST 630   25,3276  55'671 1           TS       KCOEFCTR
 01352   REF  235 LAST 632   25,3277  3 7665 0           CAF      ZERO
 0136    REF    1            25,3300  1 3104 0           TCF      COEFFA

 0146    REF  236 LAST 633   25,3301  3 7665 0  KONENOW  CAF      ZERO              K=1, SO 1-K AT EITHER SCALING IS ZERO
 01461                       25,3302  22 007 0           ZL                         EXTEND, DCA DPZERO IS FASTER BUT WASTES
 01462   REF    5 LAST 630   25,3303  53'660 1           DXCH     (1-K)QR           STORAGE IN SWITCHED FIXED UNLESS IN FF
 01463   REF    2 LAST 630   25,3304  3 3403 0           CAF      10AT16WL          WFORQR = K/DT = 10K = 10
 01464   REF    7 LAST 630   25,3305  55'656 1           TS       WFORQR            SCALED AT 16
 01465   REF    2 LAST 630   25,3306  3 3375 0           CAF      .05AT.5           SAVE (.1-.05K) SCALED AT 1/2
 01466   REF   96 LAST 631   25,3307  54 065 0           TS       ITEMP1            FOR AOSTERMS
 01467   REF    1            25,3310  3 3404 1           CAF      .75               SET COEFFA = .75
 014675  REF   40 LAST 632   25,3311  54 066 0           TS       ITEMP2
 01468   REF    1            25,3312  1 3132 0           TCF      COEFFA1
 0149    REF    1            25,3313  3 3405 0  NEXTCALL CAF      2SECSAOS          SET UP WAITLIST CALL FOR TWO SECS
 0150    REF   83 LAST 618   25,3314  0 4536 0           TC       WAITLIST
 0151                        25,3315   03064 0           2CADR    AOSTASK
C0151    REF    2 LAST 187   25,3316   52006 0
 01511   REF   89 LAST 633   25,3317  3 7656 0           CAF      TWO               INCREMENT TIME COUNTER
 01512   REF    6 LAST 633   25,3320  27'671 1           ADS      KCOEFCTR
 0152    REF  237 LAST 633   25,3321  3 7665 0           CAF      ZERO              ZERO SUMMED RATES
 0153    REF    6 LAST 631   25,3322  55'640 0           TS       SUMRATEQ
 0154    REF    5 LAST 631   25,3323  55'641 1           TS       SUMRATER
 0155    REF   68 LAST 625   25,3324  1 4602 0           TCF      TASKOVER

 0156    REF    1            25,3325  3 3406 0  COASTASC CAF      0.3125WL
 0157    REF    8 LAST 633   25,3326  55'656 1           TS       WFORQR   ← WFORP
 0158                        25,3327  0 0006 1           EXTEND
 0159    REF    1            25,3330  3 3415 1           DCA      (1-K)S
 0160    REF    6 LAST 633   25,3331  53'660 1           DXCH     (1-K)QR
 0161    REF   23 LAST 585   25,3332  3 7655 0           CAF      BIT3
 0162    REF   43 LAST 630   25,3333  7 0765 1           MASK     DAPBOOLS
 0163    REF   24 LAST 633   25,3334  6 7655 0           AD       BIT3
 0164    REF   44 LAST 633   25,3335  54 765 1           TS       DAPBOOLS
 0165    REF    1            25,3336  3 3402 1           CAF      0.30680
 0166    REF   17 LAST 590   25,3337  55'650 1           TS       .5ACCMNE
 01661   REF    5 LAST 632   25,3340  55'651 0           TS       .5ACCMNQ
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L         AOSTASK                                                                      USER'S OWN PAGE NO.  5

 01662  REF    4 LAST 582      25,3341   55'652 0               TS      .5ACCMNR
 01663  REF    4 LAST 582      25,3342   55'653 1               TS      .5ACCMNU
 01664  REF    4 LAST 581      25,3343   55'654 0               TS      .5ACCMNV
 0167                          25,3344   0 0006 1               EXTEND
 0168   REF    7 LAST 633      25,3345   3 1446 0               DCA     1/2JTSQ
 0169   REF    6 LAST 632      25,3346   53'662 0               DXCH    1/NJTSQ
 0170                          25,3347   0 0006 1               EXTEND
 0171   REF    3 LAST 592      25,3350   3 1450 1               DCA     1/2JETSU
 0172   REF    1               25,3351   53'664 0               DXCH    1/NJTSU
 0173   REF    1               25,3352   3 3407 1               CAF     0.00167A
 0174   REF    6 LAST 589      25,3353   55'647 1               TS      MINIMPDB
 01741  REF    6 LAST 589      25,3354   55'646 0               TS      DBMINIMP
 0175   REF  238 LAST 633      25,3355   3 7665 0               CAF     ZERO
 0176   REF   12 LAST 632      25,3356   55'634 0               TS      AOSQ
 0177   REF    7 LAST 631      25,3357   55'635 1               TS      AOSR
 0178   REF    6 LAST 631      25,3360   55'642 1               TS      AOSQTERM
 0179   REF    5 LAST 631      25,3361   55'643 0               TS      AOSRTERM
 0180   REF    8 LAST 633      25,3362   55'665 1               TS      QMANDACC
 0181   REF    3 LAST 583      25,3363   55'666 1               TS      RMANDACC
 0182   REF    3 LAST 582      25,3364   55'667 0               TS      UMANDACC
 0183   REF    3 LAST 582      25,3365   55'670 0               TS      VMANDACC
 0184   REF   69 LAST 633      25,3366   1 4602 0               TCF     TASKOVER

 0185   REF   97 LAST 633                  0065  AXISCNTR EQUALS ITEMP1
 0186                          25,3367   77160 0  DEC-399   DEC     -399                 BOUND FOR CONSTANT RANGE: T.GE.400 SECS.
 0187                          25,3370   00024 1  0.0012    DEC     0.0012
 0188                          25,3371   20510 1  0.52      DEC     0.52
 0189                          25,3372   77537 0  DEC-160   DEC     -160
 0190                          25,3373   00047 1  0.0024    DEC     0.0024
 0191                          25,3374   13555 0  0.366     DEC     0.366
 0192                          25,3375   03146 1  .05AT.5   DEC     0.1
 0193                          25,3376   06315 0  .1AT.5    DEC     0.2
 0194                          25,3377   26501 1  .707WL    DEC     0.70711
 0195                          25,3400   77456 0  -.02R/S2  DEC     -.01273
 01951                         25,3401   00641 1  .04R/S2   DEC     0.02546
 0196                          25,3402   11643 0  0.30680   DEC     0.30680
 0197                          25,3403   24000 1  10AT16WL  DEC     0.625
 0198                          25,3404   30000 1  .75       DEC     0.75
 0199   REF    2 LAST 633                25,3402  AMINCNST EQUALS 0.30680
 0200                          25,3405   00310 0  2SECSAOS  DEC     200
 0201                          25,3406   12000 1  0.3125WL  DEC     0.3125
 0202                          25,3407   00033 1  0.00167A  DEC     0.00167
 02021                         25,3410   00024 1  0.00125   DEC     0.00125
 02022                         25,3411   00027 1  0.0014    DEC     0.0014
 02023                         25,3412   16051 1  0.44      DEC     0.44
 02024                         25,3413   00321 1  +.02R/S2  DEC     0.01273
 0203                          25,3414   20000 0  (1-K)S    DEC     0.5
 0204                          25,3415   02000 0            DEC     0.0625
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WCHANGER   CAF     0.3125WL
           TS      WFORP
           TS      WFORQR
           EXTEND
           DCA     (1-K)S
           DXCH    (1-K)QR
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L       RCS FAILURE MONITOR                                             USER'S OWN PAGE NO.   1
 07575                                   12,3752           BANK   12
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L        RCS FAILURE MONITOR                                                                USER'S OWN PAGE NO.   2

P0758    FAILURE MONITOR FOR LEM RCS JETS (4 TIMES/SECOND)

R0759    *** FAILSW CAPABILITY FOR CHECKOUT ONLY ***

 0760    REF   1                 12,3752  11'510 0  RCSMONIT CCS      FAILSW
 0761    REF   1                 12,3753  1 4606 1           TCF      ENDRCSFL            DO NOTHING IF POSITIVE

 0762    REF   1                 12,3754  3 1511 0           CA       LASTFAIL            LAST FAILURE CHANNEL VALUE
 0763                            12,3755  0 0006 1           EXTEND
 0764                            12,3756  06 032 0           RXOR     32
 0765    REF  11 LAST 595        12,3757  7 5235 1           MASK     LOW8
 0766                            12,3760  0 0006 1           EXTEND
 0767    REF   1                 12,3761  1 4606 1           BZF      NOSTCHG             NO STATUS CHANGE, FINISHED

 0768                            12,3762  0 0006 1           EXTEND
 0769    REF   1                 12,3763  3 3766 0           DCA      MNTRCS
 0770                            12,3764  52 006 0           DTCB
 0771                            12,3765   03416 1  MNTRCS   2CADR    RCSMNTR
C0771    REF   1                 12,3766   52006 0
 0772                                     12,3767  ENDT4S   EQUALS



 0773                                     25,3416           BANK     25
 0774    REF 239 LAST 634        25,3416  3 7665 0  RCSMNTR  CA       ZERO                THERE IS A DIFFERENCE,CLEAR MASKS
 1711    REF   3 LAST 595        25,3417  55'512 1           TS       CH5MASK
 1712    REF   2 LAST 558        25,3420  55'513 0           TS       CH6MASK

 1713                            25,3421  0 0006 1           EXTEND                       READ PRESENT FAILURES
 1714                            25,3422  00 032 0           READ     32
 1715    REF   2 LAST 636        25,3423  55'511 1           TS       LASTFAIL            SAVE FOR NEXT PASS

 1716                            25,3424  4 0000 0           COM                          FAILURES NOW ONES
 1717                            25,3425  0 0006 1           EXTEND
 1718    REF  41 LAST 632        25,3426  7 7651 0           MP       BIT7                SHIFT TO TEST LOW 8 BITS
 1719    REF 240 LAST 636        25,3427  3 7665 0           CA       ZERO
 1720    REF   1                 25,3430  54 065 0           TS       FAILCTR             INITIALIZE COUNTER
 1721    REF 228 LAST 630        25,3431  3 0001 0           CA       L
 1722    REF   1                 25,3432  1 3435 1           TCF      NXTRCSPR +1

 1723    REF  51 LAST 617        25,3433  6 7657 1   -1      AD       BIT1
 1724    REF   2 LAST 636        25,3434  24 065 1  NXTRCSPR INCR     FAILCTR
 17245                           25,3435  6 0000 1   +1      DOUBLE
 1725    REF   1                 25,3436  54 066 0           TS       FAILTEMP            OVERFLOW CHECK
 1726    REF   2 LAST 636        25,3437  1 3434 0           TCF      NXTRCSPR

 1727    REF   3 LAST 636        25,3440  50 065 1           INDEX    FAILCTR
 1728    REF   1                 25,3441  0 3445 1           TC       RCSFJUMP            GO THROUGH JUMP TABLE

 1729    REF   2 LAST 636        25,3442  10 066 0           CCS      FAILTEMP
 1730   REF   3 LAST 636    25,3443  1 3433 1             TCF      NXTRCSPR -1      FINISH EARLY, OR MORE TO DO

 1731   REF   2 LAST 636    25,3444  1 4606 1             TCF      ENDRCSFL
 1732   REF   1             25,3445  1 3455 1  RCSFJUMP   TCF      FM10/11
 1733   REF   1             25,3446  1 3462 0             TCF      FM9/12
 1734   REF   1             25,3447  1 3467 0             TCF      FM13/15
 1735   REF   1             25,3450  1 3474 1             TCF      FM14/16
 1736   REF   1             25,3451  1 3501 1             TCF      FM6/7
 1737   REF   1             25,3452  1 3506 0             TCF      FM1/3
 1738   REF   1             25,3453  1 3513 1             TCF      FM5/8
 1739   REF   1             25,3454  1 3520 1             TCF      FM2/4

 1740   REF  44 LAST 623    25,3455  3 7652 1  FM10/11    CA       BIT6
 1741   REF   4 LAST 636    25,3456  27'512 1             ADS      CH5MASK
 1742   REF  43 LAST 620    25,3457  3 7654 1             CA       BIT4
 1743   REF   3 LAST 636    25,3460  27'513 0             ADS      CH6MASK
 1744   REF 298 LAST 629    25,3461  0 0002 0             TC       Q

 1745   REF  29 LAST 620    25,3462  3 7653 0  FM9/12     CA       BIT5
 1746   REF   5 LAST 637    25,3463  27'512 1             ADS      CH5MASK
 1747   REF  30 LAST 637    25,3464  3 7653 0             CA       BIT5
 1748   REF   4 LAST 637    25,3465  27'513 0             ADS      CH6MASK
 1749   REF 299 LAST 637    25,3466  0 0002 0             TC       Q

 1750   REF  42 LAST 636    25,3467  3 7651 1  FM13/15    CA       BIT7
 1751   REF   6 LAST 637    25,3470  27'512 1             ADS      CH5MASK
 1752   REF  25 LAST 633    25,3471  3 7655 0             CA       BIT3
 1753   REF   5 LAST 637    25,3472  27'513 0             ADS      CH6MASK
 1754   REF 300 LAST 637    25,3473  0 0002 0             TC       Q

 1755   REF  32 LAST 630    25,3474  3 7650 0  FM14/16    CA       BIT8
 1756   REF   7 LAST 637    25,3475  27'512 1             ADS      CH5MASK
 1757   REF  33 LAST 637    25,3476  3 7650 0             CA       BIT8
 1758   REF   6 LAST 637    25,3477  27'513 0             ADS      CH6MASK
 1759   REF 301 LAST 637    25,3500  0 0002 0             TC       Q

 1760   REF  44 LAST 637    25,3501  3 7654 1  FM6/7      CA       BIT4
 1761   REF   8 LAST 637    25,3502  27'512 1             ADS      CH5MASK
 1762   REF  52 LAST 636    25,3503  3 7657 1             CA       BIT1
 1763   REF   7 LAST 637    25,3504  27'513 0             ADS      CH6MASK
 1764   REF 302 LAST 637    25,3505  0 0002 0             TC       Q

 1765   REF  53 LAST 637    25,3506  3 7657 1  FM1/3      CA       BIT1
 1766   REF   9 LAST 637    25,3507  27'512 1             ADS      CH5MASK
 1767   REF  31 LAST 617    25,3510  3 7656 0             CA       BIT2
 1768   REF   8 LAST 637    25,3511  27'513 0             ADS      CH6MASK
 1769   REF 303 LAST 637    25,3512  0 0002 0             TC       Q

 1770   REF  26 LAST 637    25,3513  3 7655 0  FM5/8      CA       BIT3
 1771   REF  10 LAST 637    25,3514  27'512 1             ADS      CH5MASK
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  1772    REF  45 LAST 637     25,3515  3 7652 1             CA      BIT6
  1773    REF   9 LAST 637     25,3516  27'513 0             ADS     CH6MASK
  1774    REF 304 LAST 637     25,3517  0 0002 0             TC      Q

  1775    REF  32 LAST 637     25,3520  3 7656 0  FM2/4      CA      BIT2
  1776    REF  11 LAST 637     25,3521  27'512 1             ADS     CH5MASK
  1777    REF  43 LAST 637     25,3522  3 7651 1             CA      BIT7
  1778    REF  10 LAST 638     25,3523  27'513 0             ADS     CH6MASK
  1779    REF 305 LAST 638     25,3524  0 0002 0             TC      Q

  1780    REF  40 LAST 625                  4606  ENDRCSFL   EQUALS  RESUME
  1781    REF  41 LAST 638                  4606  NOSTCHG    EQUALS  RESUME
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L        ASCENT INERTIA UPDATER                                                          USER'S OWN PAGE NO.   1

 0001    REF    1             25,3525  0 3570 0  IXXTASK  TC      JACCESTP

 0002    REF    1             25,3526  0 3563 1           TC      ASCENGON

 0003                         25,3527  0 0006 1           EXTEND
 0004    REF    1             25,3530  27'461 1           DIM     IXX
 0005    REF    1             25,3531  3 3560 1           CAF     IXXTIME
 0006    REF   84 LAST 633    25,3532  0 4536 0           TC      WAITLIST
 0007                         25,3533   03525 0           2CADR   IXXTASK
C0007    REF    3 LAST 559    25,3534   52006 0
 0008    REF   70 LAST 634    25,3535  1 4602 0           TCF     TASKOVER

 0009    REF    1             25,3536  0 3604 0  IYYTASK  TC      JACCESTQ

 0010    REF    2 LAST 639    25,3537  0 3563 1           TC      ASCENGON

 0011                         25,3540  0 0006 1           EXTEND
 0012    REF    2 LAST 559    25,3541  27'462 1           DIM     IYY
 0013    REF    1             25,3542  3 3561 0           CAF     IYYTIME
 0014    REF   85 LAST 639    25,3543  0 4536 0           TC      WAITLIST
 0015                         25,3544   03536 1           2CADR   IYYTASK
C0015    REF    3 LAST 559    25,3545   52006 0
 0016    REF   71 LAST 639    25,3546  1 4602 0           TCF     TASKOVER

 0017    REF    1             25,3547  0 3621 1  IZZTASK  TC      JACCESTR

 0018    REF    3 LAST 639    25,3550  0 3563 1           TC      ASCENGON

 0019                         25,3551  0 0006 1           EXTEND
 0020    REF    2 LAST 559    25,3552  27'463 0           DIM     IZZ
 0021    REF    1             25,3553  3 3562 0           CAF     IZZTIME
 0022    REF   86 LAST 639    25,3554  0 4536 0           TC      WAITLIST
 0023                         25,3555   03547 1           2CADR   IZZTASK
C0023    REF    3 LAST 559    25,3556   52006 0
 0024    REF   72 LAST 639    25,3557  1 4602 0           TCF     TASKOVER

 0025                         25,3560   00310 0  IXXTIME  DEC     200
 0026                         25,3561   02424 1  IYYTIME  DEC     1300
 0027                         25,3562   00264 1  IZZTIME  DEC     180

 0028    REF   34 LAST 637    25,3563  3 7650 0  ASCENGON CAF     BIT8
 0029    REF   45 LAST 633    25,3564  7 0765 1           MASK    DAPBOOLS
 0030    REF  371 LAST 628    25,3565  10 000 0           CCS     A
 0031    REF  306 LAST 638    25,3566  0 0002 0           TC      Q
 0032    REF   73 LAST 639    25,3567  1 4602 0           TCF     TASKOVER

 0033    REF    2 LAST 639    25,3570  31'461 0  JACCESTP CAE     IXX
 0034                         25,3571  22 007 0           ZL
 0035                         25,3572  0 0006 1           EXTEND
 0036    REF    2 LAST 558    25,3573  11'464 1           DV      4JETTORK
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L       ASCENT INERTIA UPDATER                                                    USER'S OWN PAGE NO.  2

 0037                          25,3574   6 0000 1             DOUBLE
 0038   REF    5 LAST 552      25,3575  55'444 0              TS        1/2JTSP

 0039   REF    1               25,3576   3 3660 1             CAF       JETTORK
 0040                          25,3577  22 007 0              ZL
 0041                          25,3600   0 0006 1             EXTEND
 0042   REF    3 LAST 639      25,3601  11'461 1              DV        IXX
 0043   REF    7 LAST 553      25,3602  55'627 1              TS        1JACC

 0044   REF  307 LAST 639      25,3603   0 0002 0             TC        Q

 0045   REF    3 LAST 639      25,3604  31'462 0   JACCESTQ   CAE       IYY
 0046                          25,3605  22 007 0              ZL
 0047                          25,3606   0 0006 1             EXTEND
 0048   REF    2 LAST 558      25,3607  11'465 0              DV        JETTORK4
 0049   REF    7 LAST 634      25,3610  55'661 0              TS        1/NJTSQ

 0050                          25,3611   6 0000 1             DOUBLE
 0051   REF    8 LAST 634      25,3612  55'445 1              TS        1/2JTSQ

 0052   REF    1               25,3613   3 3661 0             CAF       JETTORK1
 0053                          25,3614  22 007 0              ZL
 0054                          25,3615   0 0006 1             EXTEND
 0055   REF    4 LAST 640      25,3616  11'462 1              DV        IYY
 0056   REF    4 LAST 632      25,3617  55'630 1              TS        1JACCQ

 0057   REF  308 LAST 640      25,3620   0 0002 0             TC        Q
 0058   REF    3 LAST 639      25,3621  31'463 1   JACCESTR   CAE       IZZ
 0059                          25,3622  22 007 0              ZL
 0060                          25,3623   0 0006 1             EXTEND
 0061   REF    3 LAST 640      25,3624  11'465 0              DV        JETTORK4
 0062   REF    2 LAST 578      25,3625  55'662 0              TS        1/NJTSR

 0063                          25,3626   6 0000 1             DOUBLE
 0064   REF    5 LAST 583      25,3627  55'446 1              TS        1/2JTSR

 0065   REF    2 LAST 640      25,3630   3 3661 0             CAF       JETTORK1
 0066                          25,3631  22 007 0              ZL
 0067                          25,3632   0 0006 1             EXTEND
 0068   REF    4 LAST 640      25,3633  11'463 0              DV        IZZ
 0069   REF    3 LAST 571      25,3634  55'631 0              TS        1JACCR

 0070   REF    9 LAST 640      25,3635  31'445 0   COMMONQR   CAE       1/2JTSQ
 0071   REF    6 LAST 640      25,3636   6 1446 0             AD        1/2JTSR
 0072                          25,3637   0 0006 1             EXTEND
 0073   REF    3 LAST 632      25,3640   7 3377 0             MP        .707WL
 0074   REF    4 LAST 634      25,3641  55'447 0              TS        1/2JETSU          TEMP

 0075   REF   10 LAST 640      25,3642  31'445 0              CAE       1/2JTSQ
 0076                          25,3643   0 0006 1             EXTEND
 0077   REF   7 LAST 640     25,3644  7 1446 1             MP      1/2JTSR
 0078                        25,3645  0 0006 1             EXTEND
 0079   REF   5 LAST 640     25,3646  11'447 0             DV      1/2JETSU           TEMP
 0080   REF   6 LAST 641     25,3647  55'447 0             TS      1/2JETSU
 0081   REF   3 LAST 592     25,3650  55'450 0             TS      1/2JETSV

 00811  REF   5 LAST 640     25,3651  31'630 0             CAE     1JACCQ
 00812  REF   4 LAST 640     25,3652  6 1631 1             AD      1JACCR
 00813                       25,3653  0 0006 1             EXTEND
 00814  REF   1              25,3654  7 3662 1             MP      0.35356
 00815  REF   1              25,3655  55'632 0             TS      1JACCU
 00816  REF   1              25,3656  55'633 1             TS      1JACCV

 0082   REF 309 LAST 640     25,3657  0 0002 0             TC      Q

 0083                        25,3660    00050 1  JETTORK   DEC     0.00243            500 FT LBS. SCALED AT PI*2(+16)
 0084                        25,3661    00054 0  JETTORK1  DEC     0.00267            550 FT LBS. SCALED AT PI*2(+16)
 00841                       25,3662    13241 1  0.35356   DEC     0.35356
 0085                                 25,3663  ENDDAP25  EQUALS
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L       SUM CHECK END OF BANK MARKERS                                             USER'S OWN PAGE NO.  1

        REF    1                       5512          SETLOC ENDIMUF
                             5512    0 5512 1        TC
                             5513    0 5513 0        TC

        REF    1                       7701          SETLOC ENDINTF
                             7701    0 7701 0        TC
                             7702    0 7702 0        TC

        REF    1                    00,3657          SETLOC ENDINTS0
                          00,3657    0 3657 0        TC
                          00,3660    0 3660 1        TC

        REF    1                    01,3145          SETLOC ENDSLFS2
                          01,3145    0 3145 1        TC
                          01,3146    0 3146 1        TC

        REF    1                    04,3540          SETLOC ENDPINS1
                          04,3540    0 3540 0        TC
                          04,3541    0 3541 1        TC

        REF    1                    05,3524          SETLOC ENDPINS2
                          05,3524    0 3524 1        TC
                          05,3525    0 3525 0        TC

                                    06,2555          BANK    06
                          06,2555    0 2555 0        TC
                          06,2556    0 2556 0        TC

                                    07,2502          BANK    07
                          07,2502    0 2502 1        TC
                          07,2503    0 2503 0        TC

        REF    1                    10,3341          SETLOC ENDRTSTS
                          10,3341    0 3341 1        TC
                          10,3342    0 3342 1        TC

        REF    1                    11,3361          SETLOC ENDCMS
                          11,3361    0 3361 0        TC
                          11,3362    0 3362 0        TC

        REF    1                    12,3767          SETLOC ENDT4S
                          12,3767    0 3767 1        TC
                          12,3770    0 3770 1        TC

        REF    1                    13,3434          SETLOC ENDAMODS
                          13,3434    0 3434 1        TC
                          13,3435    0 3435 0        TC

        REF    1                    14,3726          SETLOC ENDIMUS1
                          14,3726    0 3726 1        TC
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L        SUM CHECK END OF BANK MARKERS                                                          USER'S OWN PAGE NO.   2

 0039                          14,3727  0 3727 0        TC

 0040    REF    1                       15,3575        SETLOC ENDRTBSS
 0041                          15,3575  0 3575 0        TC
 0042                          15,3576  0 3576 0        TC

 0043    REF    1                       16,3362        SETLOC ENDIMUS3
 0044                          16,3362  0 3362 0        TC
 0045                          16,3363  0 3363 1        TC

 0046    REF    1                       17,3730        SETLOC ENDIMUS2
 0047                          17,3730  0 3730 0        TC
 0048                          17,3731  0 3731 1        TC

 0049    REF    1                       20,3756        SETLOC ENDSLFS1
 0050                          20,3756  0 3756 0        TC
 0051                          20,3757  0 3757 1        TC

 0052    REF    1                       21,3427        SETLOC ENDPREL1
 0053                          21,3427  0 3427 0        TC
 0054                          21,3430  0 3430 0        TC

 0055    REF    1                       23,3411        SETLOC ENDDAP23
 0056                          23,3411  0 3411 0        TC
 0057                          23,3412  0 3412 0        TC

 0058    REF    1                       24,3723        SETLOC ENDDAP24
 0059                          24,3723  0 3723 1        TC
 0060                          24,3724  0 3724 0        TC

 0061    REF    1                       25,3663        SETLOC ENDDAP25
 0062                          25,3663  0 3663 1        TC
 0063                          25,3664  0 3664 0        TC

 0064    REF    1                       26,3521        SETLOC ENDDAP26
 0065                          26,3521  0 3521 1        TC
 0066                          26,3522  0 3522 1        TC


   END OF REVISION 12 OF PROGRAM AURORA BY DAP GROUP
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SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

SYMBOL H    DEFINITION    REFERENCES F ■ SYMBOL H    DEFINITION    REFERENCES F ■ SYMBOL H    DEFINITION    REFERENCES F
                                       ■                                       ■
0EBANK      20,3141 391   -   -   -    ■ 16/25QR     24,2722 573   1 564       ■ 21/22REG       0101  10   2 294 299 =
0.00125     25,3410 634   1 630        ■ 16/32400    24,2707 572   1 566       ■ 225ANG      16,3341 513   1 501
0.0012      25,3370 634   -   -   -    ■ 170ANG      16,3342 513   1 501       ■ 23.75MS     25,2210 591   1 588
0.0014      25,3411 634   1 630        ■ 17DEC       14,3660 472   1 451       ■ 250MS       06,2522 442   1 442
0.00167     23,3374 560   -   -   -    ■ 17DECML     21,3410 534   1 530       ■ 25/32       23,3101 555   2 549 550
0.00167A    25,3407 634   1 634        ■ 180ANG      16,3340 513   1 501       ■ 25/32.QR    24,2703 572   1 569
0.0024      25,3373 634   -   -   -    ■ 180DEC      17,3655 498   -   -   -   ■ 25/32QR     25,2215 591   1 590
0.1AT1      24,2627 571   2 571        ■ 180MS       23,3376 560   -   -   -   ■ 270DEG      15,3025 416   -   -   -
0.30680     25,3402 634   2 633 634    ■ 18R         11,2467 270   1 270       ■ 2+U.RATE    24,3405 582   1 568
0.31250     23,3402 561   1 560        ■ 19DECML     21,3411 534   -   -   -   ■ 2+V.RATE    24,3312 581   1 569
0.3125WL    25,3406 634   1 633        ■ 1ANG        16,3330 513   -   -   -   ■ 2BLANK      04,2541 302   5 297 336
0.35356     25,3662 641   1 641        ■ 1JACC       E6,1627 540   7 540 640   ■ 2EBANK      20,3155 392   1 393
0.366       25,3374 634   -   -   -    ■ 1JACCQ      E6,1630 540   5 564 641 = ■ 2ENTRY      14,3354 466   1 467
0.44        25,3412 634   1 630        ■ 1JACCR      E6,1631 540   4 564 641 = ■ 2-U.RATE    24,3245 580   1 569
0.52        25,3371 634   -   -   -    ■ 1JACCU      E6,1632 540   1 641     = ■ 2-V.RATE    24,3360 582   1 568
0.62170     23,3375 560   1 558        ■ 1JACCV      E6,1633 540   1 641     = ■ 2JETS+Q     24,3453 583   3 565 583
0.88975     23,3073 555   1 548        ■ 1/2JETSU    E6,1447 536   6 584 641   ■ 2JETS+R     24,3433 583   3 565 583
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■      ■ 1/2JETSV    E6,1450 536   3 584 641   ■ 2JETS+U     24,3407 582   1 582
100MRUPT       4736 160   1 160        ■ 1/2JTSP     E6,1444 536   5 549 640   ■ 2JETS+V     24,3314 581   1 581
100MSCAL    24,2770 575   1 576        ■ 1/2JTSQ     E6,1445 536  10 580 640   ■ 2JETS-Q     24,3271 580   3 565 580
100MSPTJ    E6,1622 539   2 553 558    ■ 1/2JTSR     E6,1446 536   7 579 641   ■ 2JETS-R     24,3224 579   3 566 579
10ANG       16,3336 513   1 502        ■ 1/2SECX     21,3412 534   1 534       ■ 2JETS-U     24,3247 580   1 580
10AT16      23,3400 561   1 559        ■ 1/4JETAC    25,2322 595   1 595       ■ 2JETS-V     24,3362 582   1 582
10AT16WL    25,3403 634   2 630 633    ■ 1/6         10,3325 257   1 256       ■ 2JETSM+U    24,3404 582   1 582
10.6D/S     24,3722 593   1 593        ■ 1/GYRO      07,2211 215   3 213 216   ■ 2JETSM+V    24,3311 581   1 581
10SECS      11,2563 272   1 272        ■ 1/NJETAC    E6,1471 536  29 552 595   ■ 2JETSM-U    24,3244 580   1 580
11DEC       14,3657 472   1 463        ■ 1/NJTSQ     E6,1661 540   7 540 640   ■ 2JETSM-V    24,3357 582   1 582
11DEC.      01,3032 401   1 402        ■ 1/NJTSR     E6,1662 540   2 578 640 = ■ 2JETSP      23,2661 552   1 552
11DSPIN     04,3263 334   5 298 338    ■ 1/NJTSU     E6,1663 541   1 634     = ■ 2K             7645  76   4  37 133 =
120MRUPT    12,2522 163   1 163        ■ 1/NJTSV     E6,1664 541   -   -   - = ■ 2K+3           5331 360   1 360
120MS       12,3437 177   -   -   -    ■ 1/PIPA      07,2000 211   2 211 516   ■ 2MIN        06,2310 437   1 437
128/164     26,3520 629   1 629        ■ 1/PIPADT       1110  17   7  17 534   ■ 2PJETS      23,2462 549   2 546 553
12SECS      11,2564 272   2 272        ■ 1/PIPAGT    21,3407 534   1 534       ■ 2RNDEND     04,3074 327   -   -   -
135ANG      16,3335 513   2 501 502    ■ 1SEC+1      11,2473 270   1 269       ■ 2ROUND      04,3064 326   4 324 326
13-11,1     05,3521 365   1 364        ■ 1SECRUPT    23,3123 556   1 556       ■ 2/4JET+Q    24,3441 583   1 581
13,14,15    13,2746 208   1 195        ■ 1SECX       17,3626 498   1 475       ■ 2/4JET+R    24,3414 582   1 582
13,7,2         5076 229   1 229        ■ 1SECXT      E5,1744  24   3 475 534 = ■ 2/4JET-Q    24,3257 580   -   -   -
14C            0014 498   6 483 500 =  ■ 1STO2S      15,3410 426   2 455 470   ■ 2/4JET-R    24,3205 579   -   -   -
14-TJMIN    23,3070 555   3 549 551    ■ 1TO2SUB     15,3440 426   6 426       ■ 2SECSAOS    25,3405 634   1 633
14-TQRMN    24,2712 572   3 572        ■ 1,9-OUT     24,2727 573   1 570       ■ 2SECWLT4    12,3746 188   1 187
15BITADR       6172  40   1  46        ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■     ■ 2V1STO2S    15,3431 426   2 424
160ANG      16,3337 513   1 502        ■ 20BIAS      04,2641 316   2 315       ■ 2,10-OUT    24,2724 573   1 570
16/25       23,3074 555   1 545        ■ 20MRUPT     12,2564 164   1 163       ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■

KEY: SYMBOLS DEFINED BY EQUALS ARE FLAGGED =.  OTHERS ARE NORMALLY DEFINED EXCEPT THOSE FLAGGED:

U UNDEFINED                 E FAILED LEFTOVER ERASE   M MULTIPLY DEFINED          T WRONG MEMORY TYPE    MM MULTIPLE ERRORS
N NEARLY DEFINED BY =       J FAILED LEFTOVER WORD    O OVERSIZE- OR ILL-DEFINED  C CONFLICT IN MEMORY   X  MISC. TROUBLE
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SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

  SYMBOL H    DEFINITION     REFERENCES FI ■  SYMBOL H    DEFINITION     REFERENCES F ■  SYMBOL H    DEFINITION     REFERENCES F
                                           ■                                          ■
  30BUF0     E4,1650  22     2 443       = ■  6.6AT16    23,3401 561     1 559        ■  ABCLOAD    05,2535 319     1 305
  30BUF1     E4,1644  22     2 443       = ■  6LOW       16,3343 513     1 510        ■  ABLOAD     05,2572 319     1 305
  30MRUPT    12,2563 164     1 162         ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  ABORT         5446 367    10 108 367
  30MSGMSK   11,2724 275     1 274         ■  71ANG      16,3333 513     2 501 502    ■  ABS        00,3154 105     2 105
  30RDMSK    12,3412 177     1 168         ■  72DEC      14,3664 472     1 454        ■  ABVAL      00,3127 105     -   -   -
  30SEC      14,3665 472     1 446         ■  74K           4740 160     1 162        ■  ABVALABS   00,3124 105     1  44
  33.75ANG   16,3331 513     -   -   -     ■  77DECML    21,3360 533     3 514 529    ■  ABVLAOSQ      0070 540     5 540 632 =
  33PASTE    11,2505 271     2 271         ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  ABVLAOSR      0071 540     -   -   -  =
  33RDMSK       4515 177     2 171       = ■  8192AUG    13,2566 203     1 203        ■  ABVLAOSU      0072 540     -   -   -  =
  37511ALM   14,3115 462     1 462         ■  82DEGS        5041 228     1 228        ■  ABVLAOSV      0073 540     -   -   -  =
  3990DEC    17,3656 498     1 477         ■  89TEST     04,2053 295     2 294        ■  ACCDOTLG   26,3020 619     -   -   -
  3ENTRY     14,3361 467     2 467         ■  8,5           5077 229     1 229        ■  ACCDOTQ    E6,1541 538     5 538 624
  3SEC       16,3345 513     1 512         ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  ACCDOTR    E6,1543 538     2 559     =
  3SECS         4762 189     2 170 208     ■  90ANG      16,3334 513     1 501        ■  ACCDOTSM   26,3033 620     1 619
  3SECSM        4762 208     1 191       = ■  90MRUPT       4735 160     1 160        ■  ACCEPTUP   07,2450 286     1 286
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  90SEC      13,2752 208     1 196        ■  ACCEPTWD   05,2024 303     1 303
  45ANG      16,3332 513     3 501 502     ■  90SECS     12,3436 177     2 169        ■  ACCMINVL   25,3233 632     1 633
  45DEG      17,3676 498     2 481         ■  9,6        12,2436 159     1 153        ■  ACCUROT    15,2552 409     -   -   -
  4+6BITS    16,3346 513     2 502 509     ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  ACCWD      E5,1646  24     3  24 518 =
  4ENTRY     14,3363 467     -   -   -     ■  +0CHK      20,2032 378     8 383 400    ■  ACENTRAL      0071 538     7 620 622 =
  4JETS+Q    24,3447 583     2 568 583     ■  +1CHK      20,2040 378    28 381 399    ■  ACOS3      00,3600 114     1 115
  4JETS+R    24,3427 583     2 569 583     ■  +1.5CSP    23,3065 555     1 553        ■  ACOS=0     00,3565 113     4 113 115
  4JETS-Q    24,3265 580     2 569 580     ■  +90MS      24,2720 573     -   -   -    ■  ACOSABRT   00,3653 115     -   -   -
  4JETS-R    24,3220 579     2 569 579     ■  +DECSGN    04,2164 296     1 296        ■  ACOSOVF    00,3647 115     1 113
  4JETTORK   E6,1464 536     2 558 639     ■  +DIF       11,3112 279     3 279        ■  ACOSSHR    00,3642 115     1 113
  4NEGPJET   23,3105 555     1 551         ■  +DOWN      00,2532  94     1  93        ■  ACOSST2    00,3570 113     2 113
  4PJETS     23,2550 551     1 552         ■  +.02R/S2   25,3413 634     1 632        ■  ACOSST     00,3553 113     1 113
  4POSPJET   23,3104 555     1 551         ■  +-ZERO     01,3031 401     2 402 403    ■  ACOSZERO   00,3655 115     1 113
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  +LOOP      20,3046 390     2 390        ■  ADDINDRF   21,2544 522     1 521
  5B10       01,2116 119     -   -   -     ■  +MINIMP    23,2251 546     1 546        ■  ADDRCHK    20,2706 388     -   -   -
  5BLANK1    04,2517 302     -   -   -     ■  +ON        04,2273 298     3 298 332    ■  ADDRESS       6036  36     -   -   -
  5BLANK     04,2476 301     3 301 338     ■  +SIGN      01,3121 403     1 402        ■  ADDRWD        0102  10    81  36 117
  5DEGS         5040 228     3 542 543     ■  +T6TJMIN   24,2702 572     2 566 571    ■  ADDT6JTS   E6,1503 537     6 553 572
  5.5DEGS       5037 228     1 228         ■  +TJMINT6   25,2206 591     1 589        ■  ADDTIME    11,3244 283     1 283
  5/8+1         4361 125     1 124         ■  +XPOLADR   25,3033 602     1 594        ■  ADDTLT6    E6,1504 537     9 553 572
  5SECS      10,3234 254     1 254         ■  +XTRANS    24,2532 570     1 570        ■  ADIAX      E3,1443  18     2 212 349
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  +X,A       24,2725 573     1 570        ■  ADIAY      E3,1444  18     1 212
  600MS      13,2751 208     1 195         ■  +X,B       24,2726 573     1 570        ■  ADIAZ      E3,1445  18     1 212
  60DEC      14,3661 472     1 465         ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  ADRS1      20,2015 377     3 381 396
  60SEC      14,3666 472     1 445         ■  A2CNTRAL      0076 538    14 621 622 = ■  ADRS+1     20,3402 395     -   -   -
  63DEC      14,3662 472     2 463 464     ■  A             0000   7   371  29 639 = ■  ADRSCHK    20,3362 395     2 394
  63/64+1       4362 125     2 124 623     ■  A+B        E6,1517 537     5 579 590    ■  ADSRAX     E3,1446  18     2 212 349
  69DEC      14,3663 472     1 463         ■  A+B/A-B    24,3167 579     -   -   -    ■  ADSRAY     E3,1447  18     1 212

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  SYMBOL H  DEFINITION    REFERENCES F ■ SYMBOL H  DEFINITION    REFERENCES F ■ SYMBOL H  DEFINITION    REFERENCES F
                                       ■                                      ■
  ADSRAZ    E3,1450  18   1 212        ■ ALSK      21,3367 533   1 518        ■ AOTSM     15,3173 420   -   -   -
  ADSUM     20,3351 395   3 394 395    ■ ALT          0352  15   9 165 504    ■ AOTSTALL  13,2714 207   1 207
  ADVAN        4465 137   -   -   -    ■ ALTASK    14,3504 468   2 468 469    ■ ARCCOS    00,3540 113   1  44
  AGSBUFF   E7,1547  25  28 370        ■ ALTIM     E5,1664  24   3 515      = ■ ARCSIN    00,3536 113   1  44
  AGSINIT2  11,2557 272   1 272        ■ ALTIMS    E5,1665  24   2 515 516  = ■ ARCTRIG   15,2440 406   8 404 470
  AGSINIT   11,2524 272   1 258        ■ ALTM         0060   8   2 165 468  = ■ ARG90        4267 123   1 123
  AGSJOB    11,2541 272   1 272        ■ ALTMET    14,3524 469   3 466 469    ■ ARG+         7244  66   1  66
  AGSLIST   15,2001 370   1 272        ■ ALTNEG1   23,2532 550   1 550        ■ ARGHI     00,3345 109   2 110
  AGSWORD      0412  16  12 151 370    ■ ALTNEG2   23,2525 550   -   -   -    ■ ARGLO     00,3416 110   1 110
  AINGYRO   21,3362 533   1 523        ■ ALTOUT    12,2565 165   1 164        ■ ARGZERO2     7261  66   1  66
  AINLA     E5,1570  23  36  23  24  = ■ ALTPOS1   23,2514 550   1 550        ■ ARGZERO      7264  66   1  66
  A-B       E6,1520 537   3 579 582    ■ ALTPOS2   23,2507 550   -   -   -    ■ ARITH     17,2732 485   3 485
  A-B/ONLY  24,3171 579   1 581        ■ ALTPSELT  23,2473 550   -   -   -    ■ ARTHINSF  04,2773 325   1 324
  ALARM        5413 366  31 169 525    ■ ALTRATE      0354  15   8 165 504    ■ ARTOA     12,2715 167   1 165
  ALARMS    17,2440 481   5 479 486    ■ ALTRMET   14,3551 469   2 466        ■ ARTOUTSF  04,2642 316   1 315
  ALBITS    14,3644 472   1 468        ■ ALTROUT   12,2632 166   1 164        ■ ARUPT        0010   7  11  27 147  =
  ALCGKK    21,2127 516   1 516        ■ ALTSAVE      0364  15  13 165 376    ■ ASCCOAST  12,3651 187   -   -   -
  ALDK      E5,1666  24   3 516 517  = ■ ALT,R,VN  11,3121 279   1 278        ■ ASCDAP    12,3660 187   1 187
  ALFDK     21,3122 530   1 516        ■ ALWAYS    14,3471 468   1 468        ■ ASCENGON  25,3563 639   3 639
  ALFLT1    21,2115 516   1 527        ■ ALWAYSG   21,2466 521   2 517 521    ■ ASCFLGHT  25,2234 594   -   -   -
  ALFLT2    21,2144 516   2 516        ■ ALXIS     E5,1600  24   6 514 533  = ■ ASCLEM    12,3644 186   -   -   -
  ALFLT     21,2104 516   1 515        ■ ALXXXZ    21,3361 533   1 514        ■ ASCNTPOL  25,3013 602   1 594
  ALGORTHM  26,3101 621   1 620        ■ AMEMORY   E4,1400  19  93  19  22    ■ ASFTEST   26,3047 620   1 620
  ALILP     21,2214 517   1 517        ■ AMINCNST  25,3402 634   1 633      = ■ ASINEX    00,3635 114   1 113
  ALINTIME  11,2303 266   1 258        ■ ANGLREAD  10,2712 248   -   -   -    ■ ATERDSPY  23,2010 542   1 542
  ALK       E5,1602  24   5 517      = ■ ANGX      E5,1634  24   5 376 523  = ■ ATTCK2    11,2613 273   3 273 503
  ALKCG2    21,2135 516   1 516        ■ ANGY      E5,1632  24   4 376 523  = ■ ATTCONT   11,3314 368   1 368
  ALKCG     21,2132 516   -   -   -    ■ ANGZ      E5,1626  24   4 376 523  = ■ ATTHLDDB  12,3635 184   2 184
  ALKLP     21,2223 517   1 518        ■ ANNNNNN   21,2740 526   2 514 522    ■ ATTSTEER  24,2743 575   2 565 566
  ALL+XJTS  24,2723 573   1 570        ■ AOSQ      E6,1634 540  12 540 634    ■ AUG2      13,2601 203   1 203
  ALLAXES   25,3213 632   1 632        ■ AOSQTERM  E6,1642 540   6 188 634    ■ AUG3      13,2557 203   1 203
  ALLDC/OC  05,2676 321   2 319        ■ AOSR      E6,1635 540   7 631 634  = ■ AURLOKON  11,3001 277   2 264 462
  ALLDONE   12,2706 166   1 166        ■ AOSRTERM  E6,1643 540   5 188 634  = ■ AXC       01,2005 116   1  43
  ALLOOP1   21,2052 515   1 527        ■ AOSTASK   25,3064 630   2 187 633    ■ AXISCNTR     0065 634  13 632 633  =
  ALLOOP3   21,2045 515   -   -   -    ■ AOSU      E6,1636 540   1 631      = ■ AXISGEN1  15,2703 413   1 413
  ALLOOP    21,2042 515   1 525        ■ AOSV      E6,1637 540   1 632      = ■ AXISGEN2  15,2731 413   1 414
  ALLREAD   10,2637 246   1 247        ■ AOTANGCK  14,3562 470   1 267        ■ AXISGEN3  15,2754 414   1 414
  ALM/END   11,2066 259  14 258 272    ■ AOTAZ     E3,1463  19   3  28 220    ■ AXISGEN   15,2677 413   2 448 493
  ALOAD     05,2620 320   1 305        ■ AOTCADR      0372  15   1  15      = ■ AXISLOOP  25,3254 632   1 633
  ALPHAM    E4,1554  20   -   -   -  = ■ AOTEL     E3,1466  19   1 220        ■ AXISROT1  15,2604 409   1 409
  ALPHAQ    E6,1420 535   4 616 628  = ■ AOTMARK   13,2753 218   2 447        ■ AXISROT   15,2543 409   6 407 408
  ALPHAR    E6,1422 535   2 616      = ■ AOTNB     15,3051 417   2 447 448    ■ AXT       01,2000 116   1  43
  ALPHAV    E4,1452  19   -   -   -  = ■ AOTNBIMU  14,2000 444   2 267 462    ■ AZANG     E3,1471  19   1 353      =

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                                     ■                                      ■
 AZIMUTH   E5,1506  22    7 451 498  ■ BIT15         7641  76   38  33 596  ■ BUFNORM    00,2444  91    1  91
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■                                      ■

 BIIT14       6233  41    1  45      ■ BIT2          7656  76   32  76 638  ■ BURGZERO   24,3321 581    1 578
 B12-1        5234 356    -   -   - =■ BIT3          7655  76   26  76 637  ■ BVECTOR    E4,1466  20    -   -   - =
 B14+B2    10,2466 241    1 241      ■ BIT4          7654  76   44  76 637  ■ BVSU          7011  59    1  42
 B3TOB4    01,2215 122    2 121 122  ■ BIT5          7653  76   30 153 637  ■ BZE/GOTO   01,2107 119    1  43
 B5TOB8    01,2105 118    -   -   -  ■ BIT6          7652  76   45  45 638  ■ BZFCHK     20,2264 382    -   -   -
 BACK1     14,3332 466    3 467 469  ■ BIT7          7651  76   43 120 638  ■ BZMFCHK    20,2152 380    -   -   -
 BADDES    10,2454 241    1 241      ■ BIT8          7650  76   34  31 639  ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
 BADEND    13,2664 206    2 205 255  ■ BIT8,9     24,2710 572    1 567      ■ C1/2          4272 123    1 123
 BADRAD    10,2725 248    5 248 251  ■ BIT9          7647  76   27 148 625  ■ C33JMP     12,3414 177    1 171
 BANKCALL     4063  29  117 152 534  ■ BITS3&4    13,2743 208    3 190 191  ■ C33TEST    12,3103 171    5 168 170
 BANKJUMP     4105  29   12 118 453  ■ BITS4&5    12,3425 177    2 170 176  ■ C3/2          4273 123    1 123
 BANKMASK     6232  41    3  38  41  ■ BITS4&6    13,2744 208    1 190      ■ C5/2          4274 123    1 123
 BANKRUPT     0016   7   18 146 615 =■ BITS4-6    13,2745 208    1 196      ■ CADRSTOR      0323  13    8 157 343
 BANKSET      0151  12   10  31 133  ■ BITS6&15   12,3434 177    1 176      ■ CAGESUB2   12,3401 176    1 170
 BASVAC       0002 226    6 220     =■ BITS7&8    12,3430 177    1 169      ■ CAGESUB    12,3373 176    2 169 174
 BBANK        0006   7   19  27 340 =■ BITS8,9    23,3111 555    2 548      ■ CAGETEST   13,2643 205    5 192 203
 BBANKSET  25,2354 596    1 596      ■ BITS9,10   06,2425 440    3 439 440  ■ CAGETSTJ   13,2655 205    2 196 198
 BBBB      14,3126 463    1 463      ■ BITSET     12,2716 167    1 165      ■ CAGETSTQ   13,2650 205    6 190 197
 BDDV         7531  73    2  42  73  ■ BITSGONE   23,2260 546    1 545      ■ CALCDIR    E5,1614  23    4 482 500 =
 BDSU         7035  59    1  42      ■ BLANKCON   04,2554 302    2 302 315  ■ CALCGA1    15,2653 411    1 412
 BEGDES    10,2422 241    2 232 238  ■ BLANKRET      0100  10    -   -   - =■ CALCGA     15,2615 411    2 449 489
 BETAM     E4,1556  20    -   -   - =■ BLOAD      05,2631 320    1 305      ■ CALCGTA    15,2367 404    3 449 523
 BETAV     E4,1460  20    -   -   - =■ BMAGX         0042   7    -   -   - =■ CALCRATE   16,3046 506    1 502
 BGIM23    23,3140 556    1 556      ■ BMAGY         0043   7    -   -   - =■ CALCSFE    17,2706 485    -   -   -
 BGIM24    24,2740 574    1 577      ■ BMAGZ         0044   7    -   -   - =■ CALL          6644  54    1 119
 BGIM      26,3377 625    1 625      ■ BMEMORY    E5,1570  25    -   -   - =■ CALLCODE      7674  77    1  46
 BHIZ      01,2072 118    -   -   -  ■ BNKCHK     20,3440 396    -   -   -  ■ CALL/ITA   01,2127 119    1  43
 BIASCOM   04,2571 315    2 315 316  ■ BNKOPTN    20,2063 378    -   -   -  ■ CATCHFIN   11,3167 281    1 281
 BIASHI    00,2510  92    1 109      ■ BODYFLAG      0006   9    -   -   - =■ CCALL         6632  54    1  42
 BIASLO    00,2250  85    1 110      ■ BOOP       21,2300 518    1 518      ■ CCCC       14,3141 463    1 463
 BIGATER   23,2045 542    1 542      ■ BOTHSGN    04,2257 298    1 298      ■ CCSCHK     20,2111 379    1 379
 BIN3         6165 255    2 248     =■ BOV(B)     01,2077 118    1  43      ■ CCSHOLE       5464 367   24 119 500
 BINCON       5242 356    2 300 331  ■ BPL        01,2123 119    1 119      ■ CDRVE      12,2471 162    2 162
 BINROUND  04,3003 325    2 324 325  ■ BPL/BMN    01,2114 119    1  43      ■ CDU2DOT       0070 539    8 606 609 =
 BIT10        7646  76   48  84 625  ■ BRANCH        6711  56    8  66 119  ■ CDU3DOT    E6,1577 539    2 606 607
 BIT11        7645  76   31  76 628  ■ BRNCHCON   04,2540 302    1 302      ■ CDU           0076 539    8 606 609 =
 BIT12        7644  76   23 124 630  ■ BRUPT         0017   7    -   -   - =■ CDUANG     E5,1677  23    2 506     =
 BIT12-13  26,2370 611    -   -   -  ■ BUF2          0117  11   23  29 342  ■ CDUCHECK   17,2276 479    1 479
 BIT13        7643  76   31  76 633  ■ BUF           0114  11  126  11 430  ■ CDUDANG    E5,1574  23    -   -   - =
 BIT13-14     7700  77    3 467 543  ■ BUF+       00,2366  88    2  88      ■ CDUDOT        0065 539    7 606 609 =
 BIT14        7642  76   47  76 632  ■ BUF-       00,2362  88    2  88      ■ CDUFLAG    E5,1615  23    3 482 484 =

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                                        ■                                       ■
  CDUINC     15,3470 428    6 262 430   ■  CHARALRM   04,3275 335   15 294 295    ■  COARSTOL   13,2205 194    1 194
  CDUIND     E3,1454  19   12 192 195 = ■  CHARIN     04,2002 294    1 285        ■  COARZERO   16,3244 511    4 501 503
  CDULIMIT   E5,1577  23    4 506 512 = ■  CHCNTR     E4,1655  22    8 443      = ■  COASTASC   25,3325 633    1 630
  CDULOGIC   15,3345 425   13 243 455   ■  CHECKG1    17,2773 487    1 489        ■  CODE          0110  10   13 295 338 =
  CDUNDX     E5,1672  23   15 474 506 = ■  CHECKG3    17,3036 487    2 487        ■  COEFFA1    25,3132 630    1 633
  CDURATE    16,3023 506    3 502 506   ■  CHECKG5    17,3041 487    1 487        ■  COEFFA     25,3104 630    1 633
  CDUREADF   E5,1575  23    4 506 512 = ■  CHECKG     17,2771 487    4 445 480    ■  COMADRS    20,3322 394    2 395
  CDUREADI   E5,1576  23    3 506 512 = ■  CHECKLD1   14,2573 455    1 455        ■  COMMAND    E3,1451  19    6 189 195 =
  CDUTIMEF   E5,1572  23    2 506     = ■  CHECKLD2   14,2575 455    1 455        ■  COMMFX     20,3314 394    2 395
  CDUTIMEI   E5,1570  23    2 506     = ■  CHECKLD    14,2554 455    4 454 455    ■  COMMONQR   25,3635 640    -   -   -
  CDUX          0032   7   31 151 575 = ■  CHECKM     17,3023 487    2 487        ■  COMNEG     13,2206 195    1 193
  CDUXCMD       0050   7    4 174 542 = ■  CHECKMM       4702 150    1 526        ■  COMP          7616  75    4  44 105
  CDUXD         0774  17    8 280 575   ■  CHECKNJ       4457 137   11 137 400    ■  COMPCHK    07,2255 215    1 214
  CDUY          0033   7   18 151 617 = ■  CHECKP     17,3010 487    2 487        ■  COMPGS     21,2522 521    1 521
  CDUYCMD       0051   7    1 174     = ■  CHEKDRIV   26,2751 618    1 618        ■  COMPICK    05,2443 313    2 313
  CDUYD         0775  17    7 547 615   ■  CHEKSTIK   24,2250 566    1 565        ■  COMPOS     13,2134 193    1 193
  CDUYFIL    E6,1562 539    4 606 615   ■  CHK2       16,2615 501    1 502        ■  COMPTEST   05,2376 312    8 312 320
  CDUZ          0034   7   18 151 576 = ■  CHK5       16,2652 502    1 503        ■  COMPTST1   05,2400 312    -   -   -
  CDUZCMD       0052   8    1 174     = ■  CHK6       16,2724 503    1 504        ■  COMPUT     17,3250 491    1 480
  CDUZD         0776  17    6 280 615   ■  CHK7       16,2753 504    1 504        ■  COMZERO    13,2216 195    2 193 195
  CDUZFIL    E6,1564 539    2 610 615   ■  CHKBIT10   24,2205 565    1 565        ■  CONC+S1    20,2007 377    1 393
  CDUZOTST   17,2652 484    3 483 485   ■  CHKCORS    13,2154 194    1 194        ■  CONC+S2    20,2012 377    1 393
  CGOTO         6672  55    1  42       ■  CHKTIME    11,3161 281    1 281        ■  CONSTMIN   25,3263 633    1 632
  CH12BITS   14,3646 472    2 467       ■  CHKVISFZ   23,2213 545    1 560        ■  CONTINU    20,3373 395    4 395
  CH30DSPY   16,3132 509    2 509 511   ■  CHKX       16,2714 503    1 503        ■  CONUMNOR   05,2756 322    1 322
  CH5MASK    E6,1512 537   11 558 638   ■  CHNL12        0073 625    3 625      = ■  CORCTTIM   11,3235 283    1 284
  CH6MASK    E6,1513 537   10 556 638   ■  CHRPRIO       5233 356    4 285 364    ■  COREINC    01,2424 133    2 129 133
  CHAN11D    14,3376 467    1 466       ■  CKDOTIME   06,2457 441    1 441        ■  CORFOUND   01,2253 129    -   -   -
  CHAN12        0012  26    2 192     = ■  CLEAR1     04,2463 301    1 301        ■  CORRECT    17,2575 483    1 485
  CHAN12D    14,3410 467    1 466       ■  CLEAR      04,2431 301    1 294        ■  CORSCHK2   13,2166 194    2 194
  CHAN13        0013  26    3 300 364 = ■  CLOAD      05,2646 320    1 305        ■  COS22.5    24,3334 581    3 579 581
  CHAN14        0014  26    1 195     = ■  CLPASHI    04,2446 301    1 301        ■  COSINE     00,3445 111    1  44
  CHAN33        0033  26    -   -   - = ■  CLPASS        0302  13   12 157 341    ■  COSMG      E6,1466 536    6 181 182
  CHAN5D     14,3352 466    1 466       ■  CLR5       04,2466 301    1 301        ■  COSTH         0020  22   10 404 470 =
  CHAN6D     14,3370 467    1 466       ■  CMPX1      E5,1601  24    2 517      = ■  COUNT         0127  11   17 295 338 =
  CHAN       E5,1577  23    3 466     = ■  CNTRCHK    20,3251 393    -   -   -    ■  COUNTCHK   20,3043 390    1 379
  CHANDSP    05,2436 313    1 313       ■  CNTRCON    20,2000 377    1 393        ■  COUNTPL    E5,1676  23    8 477 491 =
  CHANG1        4404 126    7 126 506   ■  CNTRLOOP   20,3252 393    1 393        ■  CRITCON    04,2176 296    1 296
  CHANG2        4412 126    1  35       ■  COAROFIN      0005   9    6 444 470 = ■  CYCLSHFT   20,3260 393    -   -   -
  CHANGVB    13,3343 225    1 225       ■  COARS1     13,2077 192    1 192        ■  CYL           0022   7   23 110 393 =
  CHANJOB    01,2320 130    3 126 137   ■  COARS2     13,2122 193    2 193 195    ■  CYLTIMES   E4,1471  21    3 436      =
  CHANLOAD   05,3044 323    1 323       ■  COARS      13,2072 192    1 192        ■  CYR           0020   7   46  35 393 =
  CHAR          0103  10    5 294 296 = ■  COARSERR   13,2177 194    2 194        ■  C(BRUPT)   20,2756 389    1 388

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                                     ■                                      ■
D2CDUYFL  E6,1572 539    6 606 616   ■ DEC-160   25,3372 634    -   -   -   ■ DESCADR   24,2741 574    1 578
D2CDUZFL  E6,1574 539    4 610 616   ■ DEC-399   25,3367 634    1 630       ■ DESCBITS  11,2730 275    1 223
DAD          6751  57    1  42       ■ DECON     04,2203 297    1 296       ■ DESCDAP   12,3742 188    1 188
DANZIG       6014  35   52  51 429   ■ DECOUNT      0103  10   24 307 326 = ■ DESCLEM   12,3725 188    1 186
DAPBOOLS     0765  16   45 151 639   ■ DECRET       0101  10    2 322 323 = ■ DESCOAST  12,3732 188    -   -   -
DAPIDLER  23,3141 557    3 159 565   ■ DECROUND  04,3154 331    1 331       ■ DESCOUNT     0430  16    3 238 241
DAPLOW6   23,3103 555    1 546       ■ DECTEM       0106  10    3 314     = ■ DESLOOP   10,2427 241    1 241
DAPTIME   E6,1552 539    3 605 610   ■ DECTOBIN  04,2117 295    1 295       ■ DESLOTSX  E3,1471  19    1 353     =
DAS++     20,2356 383    -   -   -   ■ DEGCOM    04,2625 316    1 315       ■ DESLOTSY  E3,1471  19    1 353     =
DAS+INCR  20,2355 383    -   -   -   ■ DEGCON1   04,2766 325    1 324       ■ DESRET       0427  16    7  16 277
DAS+-     20,2366 383    -   -   -   ■ DEGCON2   04,2770 325    1 326       ■ DESRETRN  10,2345 238    4 238 423
DASAMPL   10,3073 250    1 252       ■ DEGINSF2  04,2734 324    1 326       ■ DETCODE      0375 226    4 219 220 =
DAS-+     20,2414 383    -   -   -   ■ DEGINSF   04,2723 324    1 324       ■ DETENTCK  23,2305 546    1 545
DATACALL     4116  30    2 330 394   ■ DEGOUTSF  04,2555 315    2 315       ■ DETVB21   13,3067 219    5 219 220
DATADSP   17,2740 486    1 486       ■ DEG/SEC   16,3360 513    1 506       ■ DF2CADR   23,3371 560    1 560
DATAFAIL  10,3156 253    1 249       ■ DEGTAB    04,2635 316    2 316       ■ DFQRAXIS  26,2553 614    1 614
DATALD    17,3065 489    2 477 480   ■ DEL          0072 538    3 622 623 = ■ DFRNT     04,3243 334    -   -   -
DATAPL    E5,1626  23   28 376 492 = ■ DELAY     E4,1614  21    1 441     = ■ DGBF      23,3404 561    2 559 560
DATAWAIT     5151 342    -   -   -   ■ DELAYCTR     0773  16    8  28 566   ■ DGBITS    10,2706 247    2 247 251
DATWAIT1     5157 343    2 343 355   ■ DELAYEX      4566 139    1 139       ■ DGCHECK2  10,3074 250    2 252
DB        E6,1415 535    8 185 589   ■ DELCDUX   E6,1673 541    2 544 576   ■ DGCHECK   10,3137 253    2 249 250
DBATTHLD  12,3751 188    2 184 187   ■ DELCDUY   E6,1674 541    1 576       ■ DGTS      26,2535 614    1 611
DBAUTO    12,3750 188    2 187 188   ■ DELCDUZ   E6,1675 541    -   -   -   ■ DGTSFADR  26,2374 611    1 610
DBMAXUM   12,3747 188    1 184       ■ DELLOAD   11,2202 262    1 262       ■ DIDFLG       0351  15    6 157 504
DBMINIMP  E6,1646 540    6 187 634   ■ DELM      E5,1704  24    6 517 518 = ■ DIDRESET  12,2717 167    1 166
DBMNMP    23,3407 561    1 560       ■ DELMLP    21,2165 517    2 517       ■ DIFEQCNT  E4,1605  20    -   -   - =
DBSELECT  12,3622 184    -   -   -   ■ DELQ         0066 537    -   -   - = ■ DINO      14,3333 466    1 466
DCDUYFIL  E6,1566 539    6 606 616   ■ DELR      E4,1452  20    3 353     = ■ DIRADRES     6041  36    2  49
DCDUZFIL  E6,1570 539    4 610 616   ■ DELTADOT  23,3403 561    1 559       ■ DIRECTN   17,2564 483    3 483 485
DCOMP        7633  75    2  75       ■ DELTAP       0066 536    3 543 558 = ■ DISINDAT  12,2640 166    2 165 166
DDDD1     14,3173 463    1 464       ■ DELTAQ    E4,1576  20    1 354     = ■ DISINDT   11,3030 278    1 267
DDDD      14,3162 463    1 465       ■ DELTAR       0070 537    -   -   - = ■ DISINDUN  11,3101 279    1 279
DDV          7525  73    1  42       ■ DELTAT       1052  17    -   -   -   ■ DISINLUP  11,3061 279    2 278 279
DDVCALL   00,2722  99    2 100       ■ DELTEST   26,3260 623    2 623 624   ■ DISPLACE  05,2753 322    2 321 322
DDV/BDDV  00,2332  88    1  73       ■ DELV         1044  17    -   -   -   ■ DISTEM       0106  10    3 312     =
DEC11     15,2220 374    1 371       ■ DELVEL    E4,1460  20    3 353     = ■ D--LCHK   20,2671 387    -   -   -
DEC17     17,3663 498    2 476 493   ■ DELVX        0403  16   12  25 516   ■ D--SC     20,2643 387    -   -   -
DEC56     17,3675 498    2 476 480   ■ DELVY        0405  25    5 212 515 = ■ DLCDUIDX  E6,1672 541    6 576
DEC585    17,3664 498    2 477 492   ■ DELVZ        0407  25    4 212 515 = ■ DLOAD        6465  50    1  42
DECBRNCH     0265  13   15 295 323   ■ DELYOFF   17,3666 498    1 479       ■ DLOADCOD     7675  77    1  49
DECDSP3   05,2522 314    2 314       ■ DEMANDAC  25,3265 633    1 632       ■ DLOAD*       7676  77    1  38
DECDSP    05,2445 313    1 305       ■ DENOM     E6,1456 536    2 590       ■ DLY2         4544 139    1 139
DECEND    04,2152 296    2 296       ■ DESANGLE  17,3652 498    2 484       ■ DMP1         7520  73    1  42

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 SYMBOL H   DEFINITION    REFERENCES F ■  SYMBOL H   DEFINITION    REFERENCES F ■  SYMBOL H   DEFINITION    REFERENCES F
                                       ■                                        ■
 DMP             7063  61    7 296 326 ■  DOTJMIN   25,2056 589    3 589        ■  DSPALARM  04,3277 335   11 305 336
 DMPR            7522  73    1  42     ■  DOTRET       0123  11    8  11 107    ■  DSPB      05,2345 312    1 305
 DMPSUB          7067  61   20  63 114 ■  DOTSUB       7136  63    3  68        ■  DSPC      05,2352 312    1 305
 DNLSTADR        0411  16    5 158 371 ■  DOUBLK    04,2535 302    2 301 302    ■  DSPCNT       0341  13    7 157 163
 DNPHASE1     15,2052 371    2 158 373 ■  DOVLOAD      6460  49    3  46        ■  DSPCOM1   05,2343 312    3 312 313
 DNPHASE2     15,2066 371    1 374     ■  DOVLOAD*     6463  49    3  46        ■  DSPCOM2   05,2357 312    2 312
 DNPHASE3     15,2154 372    1 374     ■  DP1OUTSF  04,2647 316    1 315        ■  DSPCOM3   05,2365 312    1 312
 DNPHASE4     15,2167 373    1 374     ■  DP1/12    15,3167 419    1 417        ■  DSPCOUNT     0264  13   56 158 362
 DNPHASE5     15,2207 373    1 374     ■  DP2OUTSF  04,2654 317    1 315        ■  DSPDCEND  05,2513 314    2 315 316
 DNPHASEX     15,2127 372    1 374     ■  DP3OUTSF  04,2656 317    1 315        ■  DSPDCGET  05,2454 314    1 314
 DNPHASXA     15,2121 372    1 372     ■  DPDIFF    E6,1554 539    7 608 609    ■  DSPDCPUT  05,2464 314    1 314
 DNTM1           0034  26    2 371 372 = ■  DPINCOM   04,3040 326    1 326        ■  DSPDCWD1  04,3127 331    2 331 332
 DNTM2           0035  26    1 372     = ■  DPINORM   04,3046 326    1 326        ■  DSPDECWD  04,3101 331    1 314
 DNTMBUFF     E7,1403  25   14  28 374 ■  DPINSF2   04,3050 326    1 324        ■  DSPDPDEC  04,2704 317    1 305
 DNTMEXIT     15,2146 372    4 372 373 ■  DPINSF    04,3023 326    3 324 326    ■  DSPFMEM   05,3214 330    2 305 332
 DNTMFAST     12,3332 175    1 177     ■  DPIPAY    E5,1656  24    3 516 521 =  ■  DSPIN1    04,3226 334    2 333 335
 DNTMGOTO     E7,1401  25    9 158 373 ■  DPIPAZ    E5,1662  24    1 516     =  ■  DSPIN     04,3201 333    5 295 338
 DOALARM      01,2773 367    2 153 366 ■  DPOSMAX      7636  76    1 283        ■  DSPLAY    12,2530 163    1 163
 DODES        10,2467 242    1 241     ■  DPOUT     04,2661 317    3 316 317    ■  DSPLAYC   12,2541 163    1 162
 DODLOAD         6455  49    3  46     ■  DPOUTCOM  04,2672 317    1 317        ■  DSPLIST      0327  13   11 157 361
 DODLOAD*        6071  38    4  46  49 ■  DPOUTNOR  04,2702 317    1 317        ■  DSPLOCK      0277  13   10 157 361
 DODOWNTM     15,2047 371    2  27  28 ■  DPTEST1   05,2250 308    3 308        ■  DSPLV     05,3252 333    -   -   -
 DOFCSTST     11,2401 268    1 258     ■  DPTEST    05,2236 307    4 307 323    ■  DSPMM1    05,3403 343    1 303
 DOFSTART     12,2006 151    3 153 154 ■  DRFTSUB2  07,2176 214    1 217        ■  DSPMM     05,2001 303    3 150 364
 DOMSG        11,2763 276    2 276     ■  DRIFTI    E5,1640  24    3 376 519 =  ■  DSPMMEND  05,3413 343    1 363
 DONBRD       10,2507 243    1 242     ■  DRIFTO    E5,1636  24    3 376 519 =  ■  DSPMMTEM     0124  11    2 343     =
 DONEDID      12,2711 167    3 165 166 ■  DRIFTSUB  07,2156 214    3 212        ■  DSPMSK       7663 333    1 332     =
 DOPROC       04,3452 344    2 343 359 ■  DRIFTT    E5,1576  24    5 376 520 =  ■  DSPOCTIN  04,3271 335    1 333
 DOQRSKIP     24,2630 571    1 571     ■  DRIVRAD   17,2414 481    1 481        ■  DSPOCTWD  05,3222 332    3 304 330
 DORREPOS     10,2051 232    1 180     ■  DSALMOUT     0011  26   17 137 403 =  ■  DSPOFF    12,2320 157    1 157
 DORROUT      10,2630 245    1 245     ■  DSEXIT       0100  10    3 333 334 =  ■  DSPOUT    12,2501 163    2 162
 DORSAMP2     10,3300 256    -   -   - ■  DSKYCHK   01,3034 401    1 401        ■  DSPRTRN   E4,1602  20    -   -   - =
 DORSAMP      10,3274 256    4 256 271 ■  DSKYCODE  01,3017 401    1 402        ■  DSPSCAN   12,2513 163    2 163
 DORSTART     12,2207 154    1 154     ■  DSKYRSET     4730 160    2 158 164    ■  DSPSFNOR  05,2507 314    1 314
 DOSPROOT     26,3300 623    1 623     ■  DSKYWAIT  01,3066 402    2 402 403    ■  DSPTAB       0307  13   61 151 459
 DOSSHFT      00,2302  86    1  86     ■  DSLV      04,3255 334    2 334        ■  DSPTEM1      0333  13   48 266 512
 DOSTORE         6342  45    1  35     ■  DSMAG        0126  11    2 334     =  ■  DSPTEM2      0336  13   28 220 506
 DOT6RUPT        4175  33    1  27     ■  DSMSK     04,3257 334    3 334 338    ■  DSQ       00,3122 105    1  44
 DOT             7304  67    1  42     ■  DSP2BIT   05,3255 333    3 309 343    ■  DSQSUB    00,3227 107    5 105 112
 DOTERM       04,3450 344    1 344     ■  DSP2DEC   04,3155 332    1 318        ■  DSREL        0125  11    4 333 334 =
 DOTIMES      E4,1606  21    3 441 442 = ■  DSPA      05,2340 312    1 305        ■  DSRUPTEM     0077  10    5 163     =
 DOTINC          0122  11    7  11  68 ■  DSPAB     05,2333 312    1 305        ■  DSRUPTSW     0350  15    5 158 471
 DOTIXBR      01,2056 117    -   -   - ■  DSPABC    05,2326 312    1 305        ■  DSU          6777  58    1  42

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                                        ■                                       ■
  DT         E6,1551 539   10 159 607   ■ EBANK3     11,3263 284    2 281 283   ■ ENDDPDEC   04,2722 318    1 324
  DTA        26,2665 617    2 616       ■ EBANK         0003   7   30 156 529 = ■ ENDDPUSH      6554  51    1  51
  DTCALC     26,2051 605    1 604       ■ ECE1       16,2663 503    1 502       ■ ENDEXECF      4536 138    1 139       =
  DT/2       E4,1562  20    -   -   - = ■ ECE2       16,2666 503    1 513       ■ ENDEXECS   01,2566 136    1 141       =
  DTW        26,2664 617    2 616       ■ ECE2CADR   16,3355 513    2 502 503   ■ ENDEXTVB   11,2056 259    8 259 263
  DUMMYFIL   26,2544 614    2 560 618   ■ EDOP          0023   7    7  31 393 = ■ ENDEXTVS   11,3264 284    1 368       =
  DUMMYJOB      4450 137    3 136 152   ■ EDOT       E6,1407 535   21 535 593   ■ ENDFAILF      5470 367    1 473       =
  DV1++      20,3614 398    -   -   -   ■ EDOTGEN    E6,1442 536    -   -   -   ■ ENDFAILS   01,3000 367    1 401       =
  DV1+-      20,3625 399    -   -   -   ■ EDOTNEG    24,3602 586    1 585       ■ ENDFIND       4443 127    4 129 133
  DV1CHK     20,3610 398    -   -   -   ■ EDOTP      E6,1423 535    6 535 592   ■ ENDFRESS   12,2451 159    1 162       =
  DV1-+      20,3635 399    -   -   -   ■ EDOTQ      E6,1424 535    7 535 592 = ■ ENDGTSAL   21,2553 522    -   -   -
  DV1--      20,3646 399    -   -   -   ■ EDOTR      E6,1425 535    5 535 592 = ■ ENDIBNKF      4232  33    1 123       =
  DV2CHK     20,3662 399    -   -   -   ■ EDOTUGEN   24,3652 592    2 568 569   ■ ENDIDLE       5140 342   37 219 512
  DV4CHK     20,3672 399    -   -   -   ■ EDOTVGEN   24,3656 592    2 568 569   ■ ENDIMODF      4763 189    1 227       =
  DV5++      20,3713 400    -   -   -   ■ EDOT(2)    E6,1412 535    6 535 589 = ■ ENDIMODS   13,2753 208    1 218       =
  DV5+-      20,3720 400    -   -   -   ■ EDOT(2)Q   E6,1412 535    -   -   - = ■ ENDIMU     13,2633 205    4 170 196
  DV5CHK     20,3706 400    -   -   -   ■ EDOT(2)R   E6,1414 535    -   -   - = ■ ENDIMUF       5512 473    1 642       =
  DV5-+      20,3731 400    -   -   -   ■ EDOT(R)    E6,1410 535    3 578 582 = ■ ENDIMUS1   14,3726 474    1 642       =
  DV5--      20,3737 400    -   -   -   ■ EEEE       14,3227 464    1 465       ■ ENDIMUS2   17,3730 499    1 643       =
  DV++       20,2506 385    -   -   -   ■ EIGHT         7654  76    1 583     = ■ ENDIMUS3   16,3362 513    1 643       =
  DV+-       20,2524 385    -   -   -   ■ EIGHTBAL   23,2000 542    1 544       ■ ENDINFSS   15,3342 424    1 425       =
  DVCHECK    20,3605 398    1 379       ■ EJ1        01,2551 136    6 135       ■ ENDINST       5150 342    6 297 336
  DVCHK      20,2474 385    -   -   -   ■ EJ2        01,2561 136    1 136       ■ ENDINTF       7701  77    1 642       =
  DVCON      20,2011 377   12 384 400   ■ EJFREE        4437 127   13 267 459   ■ ENDINTFF      4063  28    1  29       =
  DV-+       20,2533 385    -   -   -   ■ EJSCAN     01,2504 135    1 132       ■ ENDINTS0   00,3657 115    1 642       =
  DV-+,+     20,2543 385    -   -   -   ■ ELANG      E3,1471  19    1 353     = ■ ENDINTS1   01,2220 122    1 128       =
  DV--       20,2513 385    -   -   -   ■ ELEVEN        7660  76    2  76 363   ■ ENDJOB1    01,2474 135    1 127
  DVLOOP     20,3607 398    1 401       ■ ELRCODE    07,2436 286    1 286       ■ ENDKRURS   07,2502 288    -   -   -   =
  DVNORM     00,2451  91    3  90       ■ EMSD          0055   8    -   -   - = ■ ENDLFCSS   06,2555 443    -   -   -   =
  DVNORMCT      0123  11    6  88  99 = ■ ENABLE     17,2545 483    1 474       ■ ENDMARKS   13,3157 221    1 221
  DVOVF      00,2355  88   13  88 101   ■ END2DEC    04,3200 332    1 333       ■ ENDMAXDV   00,2546  94    2  94  96
  DVQXCHK    20,2553 385    -   -   -   ■ ENDALL     04,2150 296    1 296       ■ ENDMODE    13,2706 206    1 206
  DV/SC         7564  74    2  74       ■ ENDAMODS   13,3434 226    1 642     = ■ ENDMONDO   05,3207 330    1 330
  DVSIGN        0122  11    8  88 104 = ■ ENDCMS     11,3361 369    1 642     = ■ ENDNMTST   04,2134 296    2 295 296
  DVXSC         7403  70    2  69       ■ ENDCOUNT   20,3067 390    1 390       ■ ENDNUM     04,2144 296    1 296
  DWNRPTBB      4061  28    1  27       ■ ENDDAP23   23,3411 561    1 643     = ■ ENDNVBSY   04,3517 360    1 362
  DXCH+DIM   20,2315 382    -   -   -   ■ ENDDAP24   24,3723 593    1 643     = ■ ENDOFJOB      4440 127   55 215 525
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ ENDDAP25   25,3663 641    1 643     = ■ ENDOFUF    20,3130 391    1 391
  E1345678   20,3150 391    1 393       ■ ENDDAP26   26,3521 629    1 643     = ■ ENDPASTE      5105 330    -   -   -
  E          E6,1411 535   20 535 589   ■ ENDDAPT4      4606 188    6 187 188 = ■ ENDPHMNF      4713 150    1 160       =
  EARRTCOM   14,2210 448    2 447 448   ■ ENDDISIN   11,3055 278    3 278 279   ■ ENDPINBF      5413 362    1 366       =
  EARTHR     14,2422 453    8 445 525   ■ ENDDNTMS   15,2367 376    1 404     = ■ ENDPINS1   04,3540 362    1 642       =
  EARTTPRO   21,2674 525    1 525       ■ ENDDOT        7165  63    1 107       ■ ENDPINS2   05,3524 365    1 642       =

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                                        ■                                       ■
  ENDPINS3  16,2520 354    1 500      = ■ ENGSTEP   E4,1470  21   13 436 437 = ■ ESTIMS    21,2000 514    2 476 478
  ENDPRCHG  01,2370 130    2 130 136    ■ ENTER     05,2003 303    1 295        ■ ETHETA       0075 538    2 619 621 =
  ENDPREL1  21,3427 534    1 643      = ■ ENTERJMP  04,2051 295    1 294        ■ EVAC+2K      6710  55    1  55
  ENDRADAR  10,3235 255    3 230 241    ■ ENTEXIT      0122 303   10 304 339 = ■ EXECBANK     4447 127   10 126 137
  ENDRCSFL     4606 638    2 636 637  = ■ ENTPASO   05,2031 303    3 303 341    ■ EXECTEM1     0065   9    4 126 133 =
  ENDRMODF     5100 229    1 330      = ■ ENTRET       0122  11    7 297 341 = ■ EXECTEM2     0066   9    4 128 133 =
  ENDRMODS  10,3254 255    1 256      = ■ ENTSET    05,3363 341    1 341        ■ EXIT         6731  56    1  35
  ENDRQDAT  05,2273 308    1 308        ■ EQ        E6,1411 535    3 584      = ■ EXITEM       0100  10    7 321 322 =
  ENDRQWT   05,3343 337    1 341        ■ ER        E6,1413 535    7 535 584    ■ EXTVBACT     0332  13    6 158 259
  ENDRSTRT  12,2054 152    1 155        ■ ERASCHK   20,3137 391    1 379        ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
  ENDRTBSS  15,3575 430    1 643      = ■ ERASCON1  20,2001 377    1 392        ■ FAILCTR      0065 537    3 636       =
  ENDRTOUT  05,2535 315    1 319      = ■ ERASCON2  20,2002 377    1 392        ■ FAILDISP  01,2777 367    1 367
  ENDRTST   11,2516 271    1 271        ■ ERASCON3  20,2004 377    1 391        ■ FAILREG      1363  18   10 151 495 =
  ENDRTSTS  10,3341 257    1 642      = ■ ERASCON4  20,2005 377    1 392        ■ FAILSW    E6,1510 537    1 636
  ENDRUTIN  05,3077 324    1 328      = ■ ERASCON5  20,2013 377    1 393        ■ FAILTEMP     0066 537    2 636       =
  ENDSCALE  04,2756 325    5 325 326    ■ ERASCON6  20,2003 377    3 391 393    ■ FALNE1    17,3140 490    -   -   -
  ENDSLFS1  20,3756 401    1 643      = ■ ERASLOOP  20,3167 392    4 391 393    ■ FALNE     17,3124 490    3 475 483
  ENDSLFS2  01,3145 403    1 642      = ■ ERCNT        0103  10    7 300 363 = ■ FALTOF       5247 356    -   -   -
  ENDSPOCT  04,3274 335    -   -   -    ■ ERCOM     04,2415 300    1 300        ■ FALTON       5243 356    3 259 335
  ENDSUBSF     4363 125    1 126      = ■ ERCOMP    E5,1771  24    7  23 522 = ■ FBANK        0004   7   37  29 360 =
  ENDSUMS   20,3427 396    1 395        ■ ERCON     04,2426 300    1 300        ■ FBANKMSK     6232  41    3 132 133 =
  ENDT4FF      4755 161    1 189      = ■ ERCOUNT      1365  18    1 378      = ■ FBIASSUB  07,2322 217    3 216
  ENDT4S    12,3767 636    1 642      = ■ ERCTRANG  16,2770 504    1 503        ■ FBRANCH   E4,1570  20    -   -   - =
  ENDTASK      4567 140    4 142 156    ■ ERECTIME  E5,1746  24    5 514 526 = ■ FCNTR     E4,1404  21    5 434       =
  ENDTEST1  17,2243 478   18 475 490    ■ ERFINAL   14,2047 445    3 445 461    ■ FCS2      06,2004 431    1 431
  ENDTEST   14,2745 459   26 444 525    ■ ERLIMCHK  23,2037 542    2 542        ■ FCS3      06,2002 431    1 431
  ENDTNON2  12,3034 169    1 169        ■ ERMINUS   04,2407 300    -   -   -    ■ FCSCNTR   E4,1400  21    -   -   - =
  ENDTNON   12,3014 169    1 169        ■ EROPTN    E5,1512  22    6 444 510    ■ FCSSTART  06,2000 431    1 268
  ENDTPUSH     6556  51    2  51 106    ■ ERPLUS    04,2412 300    1 300        ■ FCSTEST1  06,2024 431    1 431
  ENDTSLC   00,2172  83    1  83        ■ ERRBZF1   20,2311 382    1 382        ■ FCSTEST   06,2026 431    -   -   -
  ENDTST03  16,2766 504   11 502 512    ■ ERRBZF2   20,2312 382    1 382        ■ FILDELV   E5,1644  24    7 521       =
  ENDVBFAN  05,2175 306    -   -   -    ■ ERRBZF3   20,2313 382    1 382        ■ FILDUMMY  26,2555 614    2 562 618
  ENDVLOAD     6515  50    2  52        ■ ERRBZF4   20,2314 382    1 382        ■ FILFIRST  26,2315 610    1 604
  ENDVPUSH     6544  51    -   -   -    ■ ERRBZMF2  20,2176 380    1 380        ■ FILSTART  26,2032 604    1 604
  ENDVXV       6754  57    1  72        ■ ERRBZMF   20,2175 380    1 380        ■ FILTAXIS  26,2257 609    -   -   -
  ENDWAITF     4614 147    1 148      = ■ ERRMASK   17,2313 479    2 479        ■ FILTER    26,2015 604    1 611
  ENDWAITS  01,2773 146    1 367      = ■ ERROR     04,2343 299    1 294        ■ FILTINIT  26,2000 604    1 574
  ENDWATCH  17,2675 485    2 484        ■ ERRORS    20,2020 378   47 378 391    ■ FILT/PAX  23,2073 543    -   -   -
  ENGONTM   06,2250 436    1 436        ■ ERTHRVSE  14,2405 453    3 444 526    ■ FINALDV   00,2547  95    3  88  94
  ENGRESET  06,2232 436    1 437        ■ ERUNITS   17,3667 498    1 492        ■ FINALT       0355  15    4 279 376
  ENGRST    06,2267 437    1 437        ■ ERVECTOR  E5,1513  22    2 453        ■ FINDKEY   13,3214 222    1 222
  ENGSET    06,2261 437    1 437        ■ ESCAPE2      0123  11    2 113 114 = ■ FINDNAVB  14,2135 447    3 444 470
  ENGSTART  06,2220 436    1 432        ■ ESCAPE       0122  11    4 113 114 = ■ FINDVAC2  01,2220 128    2 126 127

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N NEARLY DEFINED BY =      J FAILED LEFTOVER WORD     O OVERSIZE- OR ILL-DEFINED   C CONFLICT IN MEMORY    X  MISC. TROUBLE
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  FINDVAC      4374 126  13 152 527    ■ FREEDSP      5401 361  12 127 482    ■ GEOIMUTT  17,2005 475   1 534
  FINEALGN  16,3122 508   1 512        ■ FREERET      0130  11   2 361      = ■ GEOMTRX   E5,1747  24   9 497 523 =
  FINEK2    11,2223 263   1 265        ■ FREEWAIT  04,3520 362   1 361        ■ GEORGEB   17,3643 498   1 476
  FINETIME     5470 473   6 281 506    ■ FSTRADTM  15,2253 375   1 270        ■ GEORGEC   17,3635 498   1 476
  FINEZERO  16,3215 510   2 502        ■ FSTRSAMP  11,2403 269   1 267        ■ GEORGED   17,3627 498   1 476
  FINISH    17,2234 478   1 497        ■ FTEST     24,3564 585   1 586        ■ GEORGEJ   21,3373 534   2 518 523
  FIRSTADR  26,2013 604   1 604        ■ FULLDSPI  05,3456 363   1 363        ■ GEORGEK   21,3375 534   3 520
  FIRSTIME  12,2653 166   -   -   -    ■ FULLDSP   05,3455 363   1 363        ■ GEORGES   17,3510 495   -   -   -
  FIVE         7664  76  14  64 583    ■ FUNCT2    26,3165 622   1 622        ■ GEOSAVED  E5,1716  24   2 515     =
  FIXCLPAS  04,2262 298   -   -   -    ■ FUNCT3    26,3173 622   -   -   -    ■ GEOSTRT4  21,2655 524   1 527
  FIXDELAY     4554 139  10 193 430    ■ FUNCTION  E6,1530 538  21 621 624    ■ GETDET    13,3063 219   1 219
  FIXEDADR     6062  37   -   -   -    ■ FV        E4,1502  20   -   -   -  = ■ GETINREL  04,2205 297   5 295 301
  FIXLIST   15,2221 374   1 372        ■ FXADRS    20,3344 394   2 395        ■ GETMKS    13,3022 219   4 218 219
  FIXLISTB  15,2230 374   1 372        ■ FXFX      20,3330 394   1 395        ■ GIMANGSI  14,2242 448   2 447 448
  FIXLOC       0104  10  36  37 490    ■ FZF1      16,3300 512   1 512        ■ GIMBAL    26,2575 615   1 609
  FIXLSTCA  15,2243 374   1 373        ■ FZF2      16,3303 512   1 513        ■ GIMLOCK1  15,2671 412   1 411
  FIXLSTCL  15,2247 374   1 373        ■ FZF2CADR  16,3356 513   2 512        ■ GIVENT    E4,1560  20   -   -   - =
  FIXRANGE  04,2614 316   1 315        ■ FZFDSP    16,3317 512   1 512        ■ GLAMPTST  12,3200 172   1 172
  FIXROOT   00,3401 109   2 108        ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ GLINVERT  12,3171 172   1 172
  FLASHOFF     5300 357   5 264 510    ■ GBIASX    E3,1440  18   1 349      = ■ GLOCKCHK  12,3150 172   2 172
  FLASHON      5274 357  17 219 512    ■ GCOMP1    07,2242 215   1 215        ■ GLOCKMON  12,3143 172   1 171
  FLTYAXIS  26,2112 606   1 606        ■ GCOMP     E3,1451  18  28  19 217    ■ GLOCKOK   12,3752 177   5 172 177 =
  FLTZAXIS  26,2104 606   1 605        ■ GCOMPSUB  07,2127 213   6 212        ■ GMERGE    13,2507 202   1 204
  FLVELVN   11,3120 279   1 278        ■ GCOMPSW   E3,1457  19   5 212 216    ■ GMLCKCHK  14,2737 459   2 444 460
  FM10/11   25,3455 637   1 637        ■ GCOMPZER  07,2345 217   1 514        ■ GMLOCKCK  17,3123 489   1 489
  FM13/15   25,3467 637   1 637        ■ GDESELCT  13,2630 204   1 200        ■ GMODE     E4,1572  20   -   -   - =
  FM14/16   25,3474 637   1 637        ■ GENDDV    00,2512  93   2  92  96    ■ GOAGN     12,2673 166   1 166
  FM1/3     25,3506 637   1 637        ■ GENPL     E5,1570  23  46  23 492    ■ GOBB         4054  28   1  27
  FM2/4     25,3520 638   1 637        ■ GENPLAD1  14,3670 472   -   -   -    ■ GODSPALM  05,2324 309  10 303 321
  FM5/8     25,3513 637   1 637        ■ GENPLAD   17,3671 498   1 479        ■ GOIDLADR  23,3357 560   1 556     =
  FM6/7     25,3501 637   1 637        ■ GENPLADR  14,3671 472   -   -   -    ■ GOIDLE    23,3124 556   1 543
  FM9/12    25,3462 637   1 637        ■ GENSCL    00,2325  87   2  87        ■ GOLOADLV  11,2262 264   4 258
  FMAGTEST  26,3273 623   1 622        ■ GENSCR    00,2257  86   4  85 105    ■ GOODEND   13,2667 206   4 205 255
  FNZEROFN  16,3260 512   4 501 502    ■ GENSHFT2  00,2204  84   1  84        ■ GOODRAD   10,2771 249   1 250
  FORVEL       0360  15   5 166 504    ■ GENSHIFT  00,2174  84   1  73        ■ GOPROG    12,2072 153   2  27  28
  FOUNDR    E4,1430  19   -   -   -  = ■ GEOBAVR   21,2664 524   1 524        ■ GOQ       05,2712 321   1 322
  FOUNDV    E4,1436  19   -   -   -  = ■ GEOBND1   21,3046 529   -   -   -    ■ GOQTRIMG  26,2771 619   1 624
  FOUR         7655  76  23  70 582  = ■ GEOBND    21,3045 529   3 529        ■ GOSHOSUM  11,2377 268   1 258
  FOURTEEN  00,3076 103   1 101        ■ GEOCOMPS  E5,1742  24   8 475 534  = ■ GOTO         6651  54  12  55 119
  FPMINCAL  24,3606 586   2 585        ■ GEOCONS1  21,3377 534   2 521        ■ GOTOGTS   24,2735 574   1 578
  FPQR      E6,1451 536   8 585 586    ■ GEOCONS2  21,3401 534   1 521        ■ GOYFILTR  26,2107 606   1 609
  FPQRMIN   E6,1467 536   7 585 586    ■ GEOCONS3  21,3403 534   2 521        ■ GPGLOCK   12,3610 182   1 182
  FREDSPDO  04,3525 362   1 362        ■ GEOCONS4  21,3405 534   1 522        ■ GPMATRIX  12,3545 181   3 164 188

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                                        ■                                         ■
 GRABDSP       5304 359    2 394 486    ■  GYTOBETQ  E5,1616  23    2 474 500 = ■  IMUCOARS  13,2055 192    7 261 511
 GRABLOCK      0324  13   11 157 362    ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■  IMUCOARV  11,2153 261    2 261 264
 GRABUSY1   04,3454 359    1 294        ■  H         E4,1564  20    -   -   - = ■  IMUFAIL   12,3344 176    1 177       =
 GRABUSY       5315 359    1 359        ■  HALF         7642  76   29  76 496 = ■  IMUFINE   13,2227 196    5 263 508
 GRABUSYB   04,2000 294    1 359        ■  HALFDP    15,3031 416    3 406 424   ■  IMUFINED  13,2245 196    2 196 200
 GRABWAIT      5317 359   15 261 511    ■  HALFY        1105  17    3  17 124   ■  IMUFINEK  11,2204 263    1 258
 GRAVITY       1036  17    -   -   -    ■  HBRANCH   E4,1571  20    -   -   - = ■  IMUFINEV  11,2233 263    1 263
 GSELECT    13,2442 201    3 200        ■  HDAP      E6,1454 536    6 588 590   ■  IMUGOOD   13,2640 205    -   -   -
 GSHIFT        7547  73    1  42        ■  HI10      07,2477 287    1 286       ■  IMUMON    12,2720 168    2 164
 GTS2CADR   26,2377 611    2 609 610    ■  HI5          5226 356    3 163 313   ■  IMUOP2    12,3304 174    1 174
 GTS        26,2564 615    1 611        ■  HIGH9        6231  41    2  38  40   ■  IMUOP     12,3273 174    1 177
 GTSCPSS    21,3413 534    1 267        ■  HIGUESS      4325 124    1 124       ■  IMUPULSE  13,2317 198    5 215 523
 GTSFIN     16,2045 348    1 323        ■  HISCALAR     0003  26    1 473     = ■  IMUSE        0007   9    -   -   - =
 GTSFINLC   05,3042 323    1 324        ■  HISPMAX   11,2470 270    1 269       ■  IMUSEFLG     7650 208    7 169 459 =
 GTSFOUT    16,2037 348    1 314        ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■  IMUSTALL  13,2716 207   30 215 523
 GTSFOUTL   05,2511 314    1 314        ■  IBNKCALL     4156  32    3 191 552   ■  IMUTEST   17,2000 475    1 267
 GTSGTS10   21,3040 527    1 527        ■  ICDUFAIL  12,3344 176    1 177     = ■  IMUZERO2  13,2035 191    1 190
 GTSGTS1    21,2776 527    1 527        ■  ICORK2    11,2141 261    2 262       ■  IMUZERO3  13,2045 191    -   -   -
 GTSGTS2    21,3003 527    1 527        ■  ICSDEL    11,2154 262    1 261       ■  IMUZERO   13,2000 190   10 260 510
 GTSGTS3    21,3010 527    1 527        ■  IDAD1TEM     0134  11    4 307 347   ■  IMUZEROK  11,2110 260    1 259
 GTSGTS4    21,3015 527    1 527        ■  IDAD2TEM     0135  12    2 347       ■  INCLOOP2  11,2170 262    1 262
 GTSGTS5    21,3022 527    1 527        ■  IDAD3TEM     0136  12    -   -   -   ■  INCLOOP   11,2163 262    1 262
 GTSGTS6    21,3027 527    1 527        ■  IDADDTAB  16,2406 353    2 347       ■  INCORPEX  E4,1603  20    -   -   - =
 GTSGTS7    21,3034 527    1 527        ■  IDADDTEM     0126  11    -   -   - = ■  INCR      01,2040 117    1  43
 GTSOPNDZ   E5,1743  24    -   -   - =  ■  IDLEADR   12,2440 159    1 153       ■  INCRCDUS  15,3454 428    -   -   -
 GTSQAXIS   26,2773 619    1 619        ■  IDLEADRQ  24,2203 565    1 565       ■  INCRCHK   20,2407 383    -   -   -
 GTSRAXIS   26,2766 619    1 617        ■  IDLERADR  23,3357 560    2 556 560   ■  INDERASE     6133  38    1  38
 GTSTEST    26,2666 617    1 615        ■  IERASTST     6060  37    1  37       ■  INDEX2       6111  38    1  38
 GTSWTLST   E5,1745  24    3 514 525 =  ■  IFAILINH  12,2404 158    1 154       ■  INDEX        6073  38    1  36
 GUDENTRY   17,2470 482    1 482        ■  IFAILJMP  12,3406 177    1 168       ■  INDEXLOC     0114  11   12  38 117 =
 GUESS1     17,2216 478    -   -   -    ■  IFAILOK   13,2247 196    2 151 196   ■  INDJUMP      6235  42    5  37  39
 GUESS      17,2053 476    -   -   -    ■  IGC       E5,1502  22    2 404 412   ■  INDWORK      6131  38    1  38
 GWAKE2     13,2330 198    1 199        ■  IM30INIF  12,2433 159    1 151       ■  INHNTCHK  20,2752 388    1 388
 GWAKE      13,2371 199    1 199        ■  IM30INIR  12,2434 159    1 154       ■  INITFILT  24,2742 574    1 574
 GYROAGRE   13,2343 198    1 198        ■  IM33INIT  12,2435 159    1 158       ■  INITREAD  10,2653 247    6 246
 GYROBUSY   13,2364 199    1 198        ■  IMODES30     0367  15   58 151 557   ■  IN-OUT1   20,2767 389    1 379
 GYROCMD       0047   7    5 174 203 =  ■  IMODES33     0370  15   19 158 485   ■  IN-OUT2   20,3001 389    -   -   -
 GYROCTR       0047   7    3 484 500 =  ■  IMUATTCK  11,2566 273    1 258       ■  IN-OUT3   20,3015 389    -   -   -
 GYROD      E5,1521  22    1 498        ■  IMUBACK   17,2024 475    1 267       ■  INLINK       0045   7    2 157 286 =
 GYRODPL    17,3672 498    -   -   -    ■  IMUBAD    13,2641 205    4 169 205   ■  INREL        0123  11   21 295 302 =
 GYROEXIT   13,2546 203    1 203        ■  IMUCADR      0371  15    2 158 205 = ■  INRELTAB  04,2211 297    1 297
 GYROFRAC   13,2631 204    2 202 204    ■  IMUCAGE   12,3254 174    1 177       ■  INTB15+      0100  10    5  10  37
 GYRSFTST   17,2445 482    1 267        ■  IMUCOARK  11,2132 261    1 259       ■  INTBIT15     0101  10    6  10  38

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                                         ■                                        ■
  INTLZE     12,2667 166    1 166        ■ .5ACCMNQ   E6,1651 540    5 560 633 =  ■ -.04266    26,2765 619    1 619
  INTMCTBS   05,2100 304    2 304        ■ .5ACCMNR   E6,1652 540    4 560 634 =  ■ -.04438    26,3056 620    2 619
  INTPRET       6000  34   56  34 526    ■ .5ACCMNU   E6,1653 540    4 560 634 =  ■ -.08882    26,3057 620    2 620
  INTRSM        6011  34    1 132        ■ .5ACCMNV   E6,1654 540    4 560 634 =  ■ -.88975    24,2714 573    2 567
  INTVAL     21,3350 533    3 514 517    ■ .64        26,2367 611    1 605        ■ -LOKONFG   11,3027 277    1 277
  INTVEC     E5,1646  24    3 521 522 =  ■ .66667     26,3161 622    2 622        ■ -MINIMP    23,2253 546    1 546
  INTY       E5,1624  24   10  24 519 =  ■ .68387     23,3377 560    1 558        ■ -MKREJ     12,2432 159    1 153
  INTZ       E5,1630  24    2 519     =  ■ .6DEG/SC   25,2214 591    1 590        ■ -NMBR      20,3062 390    1 390
  IRIG1      07,2124 213    1 213        ■ .707       24,3523 584    3 584 592    ■ -NMBRS     20,3117 391    1 391
  IRIGCOMP   07,2045 212    -   -   -    ■ .707GTS    26,3230 623    2 623        ■ -OCT10        6142  39    1  39
  IRIGX      07,2047 212    -   -   -    ■ .707P      23,3366 560    -   -   -    ■ -ON        04,2313 298    3 298 332
  IRIGY      07,2063 212    -   -   -    ■ .707WL     25,3377 634    3 631 640    ■ -PHASE0       1071  17    3 148 153
  IRIGZ      07,2077 212    -   -   -    ■ .75        25,3404 634    1 633        ■ -PHASE1       1073  17    1 151
  ISSUP      12,3045 170    -   -   -    ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ -PHASE2       1075  17    1 151
  ISSWOFF    12,3357 176    -   -   -    ■ -0CHK      20,2033 378   23 381 400    ■ -PHASE3       1077  17    1 151
  ISSWON     12,3367 176    1 176        ■ -1CHK      20,2041 378   47 380 400    ■ -PHASE4       1101  17    1 151
  ISWCALL       4162  32    3 149 587    ■ -1.5CSP    24,2701 572    1 571        ■ -PHASE5       1103  17    1 151
  ISWRETRN      4171  32    -   -   -    ■ -1/2+2     00,2410  90    1 109        ■ -RATBD+1   26,2722 617    2 617
  ITEMP1        0065   9   97   9 634    ■ -1/8          4360 125    2 124 231    ■ -RATEDB    E6,1506 537   11 547 569
  ITEMP2        0066   9   40   9 633    ■ -20MS      25,2211 591    1 588        ■ -RATLM+1   24,3120 578    2 577
  ITEMP3        0070   9   18   9 563    ■ -2JETLIM   E6,1507 537    7 548 569    ■ -RRLIMIT   10,2222 235    2 235
  ITEMP4        0071   9   11   9 538    ■ -2MIN256   26,3517 629    1 628        ■ -SIGN      01,3104 402    1 402
  ITEMP5        0072   9   17  10 610    ■ -2MINWL    26,3516 629    2 628 629    ■ -TAN22.5   24,3336 581    2 578 579
  ITEMP6        0073  10    7 538 626    ■ -45DEGSR   10,2137 233    1 233        ■ -TGBND+1   26,2721 617    2 617
  ITURNON2   12,3247 173    2 173 174    ■ -50DEGSR   10,2140 233    -   -   -    ■ -TJMIN16   25,2207 591    3 590 591
  ITURNON    12,3224 173    1 177        ■ -70DEGS    12,3203 172    1 172        ■ -TJMINQR   25,2207 591    -   -   -  =
  IXX        E6,1461 536    3 639 640    ■ -80DEGSR   10,2141 233    2 233        ■ -TJMINT6   23,3102 555    2 545 549
  IXXTASK    25,3525 639    3 188 639    ■ -90MS      24,2717 573    -   -   -    ■ -UP        00,2542  94    1  93
  IXXTIME    25,3560 639    1 639        ■ -A2JTLIM   23,3077 555    1 548        ■ -XBND+1    24,3121 578    2 578
  IYY        E6,1462 536    4 559 640    ■ -ARATEDB   23,3100 555    1 548        ■ -XPOLADR   25,3053 603    1 594
  IYYTASK    25,3536 639    3 188 639    ■ -BIT10     12,3435 177    1 174        ■ -XTRANS    24,2543 570    1 570
  IYYTIME    25,3561 639    1 639        ■ -BIT12        4360 231    1 231     =  ■ -X,A       24,2730 573    1 570
  IZZ        E6,1463 536    4 559 640    ■ -CCSPR     01,2516 135    1 136        ■ -X,B       24,2731 573    1 570
  IZZTASK    25,3547 639    3 188 639    ■ -COMMAX    13,2747 208    2 193 195    ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
  IZZTIME    25,3562 639    1 639        ■ -COMMAX-   13,2750 208    2 193 195    ■ JACCESTP   25,3570 639    1 639
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ -D2JTLIM   23,3076 555    1 548        ■ JACCESTQ   25,3604 640    1 639
  .04R/S2    25,3401 634    -   -   -    ■ -DIF       11,3116 279    2 279        ■ JACCESTR   25,3621 640    1 639
  .05AT.5    25,3375 634    2 630 633    ■ -DRATEDB   23,3075 555    1 548        ■ JETLWADR   23,3114 556    1 552
  .075DEC    23,3410 561    1 558        ■ -ELR       12,2431 159    1 153        ■ JETOFF     06,2077 433    1 434
  .166...    15,3047 416    1 411        ■ -ENDERAS      6234  41    1  37        ■ JETOFFTM   E4,1460  21    1 434      =
  .1AT.5     25,3376 634    1 630        ■ -ENDVAC       6171  40    2  37  47    ■ JETON      06,2122 434    1 433
  .5ACCMIN   23,3406 561    1 560        ■ -GYROMIN   13,2527 202    2 202 204    ■ JETONTM    E4,1430  21    1 433      =
  .5ACCMNE   E6,1650 540   17 540 633    ■ -.02R/S2   25,3400 634    2 632        ■ JETRATE    E6,1615 539   10 539 558

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                                         ■                                         ■
  JETRATEQ  E6,1616 539     9 558 571 =  ■ KEYTEMP2      1070  17    2 286 287 =  ■ LDSKYRS   12,2561 164     1 163
  JETRATER  E6,1617 539     9 558 571 =  ■ KILLMON   05,3153 329     2 329         ■ LEFT5        5207 355     6 313 396
  JETSOFF   23,2612 551    12 546 552    ■ KILMONON     5131 342     2 337 340     ■ LEFT7COM  04,3057 326     1 326
  JETSTART  06,2065 433     1 431        ■ KKKK      14,3672 472     1 465         ■ LEFT      00,2321  87     1  84
  JETSTEP   E4,1407  21    26 431 529 =  ■ KLMNFLTR  26,2126 607    -   -   -      ■ LEFT-     00,2316  87     1  84
  JETTORK1  25,3661 641     2 640        ■ KODU      17,3301 492     1 492         ■ LEGALTST  04,2470 301     2 301
  JETTORK4  E6,1465 536     3 558 640    ■ KONENOW   25,3301 633     1 630         ■ LEMLAB1   14,3014 460     1 460
  JETTORK   25,3660 641     1 640        ■ KQ2       E6,1536 538     1 559       = ■ LEMLAB    14,2760 460     2 444 511
  JF3       06,2135 434     1 434        ■ KQ        E6,1535 538     5 538 619     ■ LEMONM       0056   8    -   -   -  =
  JFAIL1    06,2143 434     1 434        ■ KR2       E6,1540 538     1 560       = ■ LENGTHOT  E5,1527  22    13 476 526
  JFAIL     06,2161 434     1 434        ■ KR        E6,1537 538     1 560       = ■ LESCHK    12,2410 158     1 158
  JFAILCK   06,2130 434    -   -   -     ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ LGCOMP    07,2233 215     3 211 217
  JFBUF     E4,1403  21     2 434     =  ■ L            0001   7   228  29 636 =  ■ LGWAKE    13,2401 199     2 199 200
  JOBSLEEP     4416 127    13 199 512    ■ LABNBAZ   17,3710 499    -   -   -      ■ LGYRO        0357  15    14 158 522
  JOBSLP1   01,2403 132     1 127        ■ LABNBVER  17,3722 499    -   -   -      ■ LGYROBIN  11,2301 265     1 263
  JOBSLP2   01,2412 132     1 134        ■ LAGSLIST  11,2565 272     1 272         ■ LIMITS       7640  76     5 123 610 =
  JOBWAKE2  01,2414 133     1 127        ■ LAMPTEST  12,3417 177     2 172 173     ■ LITESOUT  01,3141 403     1 402
  JOBWAKE3  01,2426 133     2 133        ■ LANDMARK  E3,1474  19     2 349         ■ LLMPRS    12,2562 164     1 162
  JOBWAKE4  01,2420 133     1 133        ■ LARGE2    00,3036 102     2 101         ■ LMPCMD       0366  15     5 157 376
  JOBWAKE      4422 127    11 200 512    ■ LARGE3    00,3020 102     1 101         ■ LMPOUT    12,2454 162    -   -   -
  JOEY      23,2417 548     2 547        ■ LARGE     00,3011 101     1 101         ■ LMPRESET     4726 160     1 164
  JSTEPADR  06,2054 432     1 431        ■ LASINEX   00,3557 113     1 113         ■ LNORMT4      4737 160     1 160
  JSWITCH      0001   9    -   -   -  =  ■ LAST30    E7,1603  25     3 274         ■ LOADFLAG  17,2640 484     1 484
  JTLST     23,2716 553     2 553 573    ■ LASTBIAS  07,2341 217    -   -   -      ■ LOADGTSM  17,3612 497     3 476 526
  JTLSTADR  24,2732 573     1 572        ■ LASTFAIL  E6,1511 537     2 636         ■ LOADIC    17,2317 479     1 479
  JTOP      06,2110 433     1 433        ■ LASTPER   E6,1473 536     2 542 557     ■ LOADIT    17,2736 485    -   -   -
  JTSAREON  24,2670 572     1 572        ■ LASTQER   E6,1474 536     1 557         ■ LOADLV1   05,2002 303     1 264
  JTSATCHS  E6,1502 537    16 550 596    ■ LASTRER   E6,1475 536     1 557         ■ LOADLV    05,2663 321     7 303 323
  JTSB4T6   23,3054 555     1 555        ■ LASTSEG   13,2537 203     1 203         ■ LOADM     21,2611 523     1 523
  JTSFIRST  23,2765 554     1 553        ■ LASTXCMD     0363  15     5 166 430     ■ LOADSTAT     0301  13     5 321 343
  JTSONNOW  E6,1501 537     5 571 595    ■ LASTYCMD     0362  15     7 166 430     ■ LOADSTDT  21,3070 529     2 516 529
  JUMPLOAD  17,2072 476     1 476        ■ LATAZCHK  14,2530 455     3 444 482     ■ LOADTIME  15,3342 425     3 453 461
  JUSTOUT   23,2371 548     1 547        ■ LATITUDE  E5,1510  22     6 453 476     ■ LOADXSM   21,3107 530     3 496 530
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ LATVEL       0361  15     3 166 504     ■ LOC          0150  12    45  31 344
  K2CNTRAL     0066 538     2 620 621 =  ■ LBUF2     00,2434  90     2 112 114     ■ LOCCTR       0071   9    25 128 344 =
  K2THETA      0074 538     7 621 624 =  ■ LDANZIG   00,3641 114     1 113         ■ LOCK      17,3115 489     1 489
  KALCLOOP  23,2127 544     1 544        ■ LDATALST  E7,1400  25     4 371 372     ■ LOCTHETA  15,3467 428     1 428
  KCENTRAL     0065 538     6 619 621 =  ■ LDNPHAS1  12,2405 158     1 158         ■ LODMIXNN  16,2016 347     1 347
  KCOEFCTR  E6,1671 541     6 187 633    ■ LDNPHAS2  15,2212 374     1 371         ■ LODNLV    16,2034 347     1 347
  KEYCOM    07,2371 285     1 286        ■ LDNPHAS3  15,2214 374     1 372         ■ LODNNLOC  05,2075 304     8 304 320
  KEYRPTB3     4057  28     2  27  28    ■ LDNPHAS4  15,2215 374     1 372         ■ LODNNTAB  16,2000 347     1 304
  KEYRUPT1  07,2362 285     2  27  28    ■ LDNPHASX  15,2213 374     1 371         ■ LODSAMPT     5257 357     3 285 329
  KEYTEMP1     0077  10     7  28 287 =  ■ LDNTMGO   12,2406 158     1 158         ■ LOKONFLG     7653 236     3 245 277 =

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473423A YUL SYSTEM FOR BLK2: REVISION 12 OF PROGRAM AURORA BY DAP GROUP                    NOV 10, 1966          PAGE 657

SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

 SYMBOL H   DEFINITION    REFERENCES F ■  SYMBOL H   DEFINITION    REFERENCES F ■  SYMBOL H   DEFINITION    REFERENCES F
                                       ■                                        ■
 LOKONSW       0012   9   -   -   -  = ■  LRUPT         0011   7   -   -   -  = ■  MAXDV     00,2564  96   1  92
 LONGER     11,3150 281   2 281        ■  LRVELX     10,2644 246   1 257        ■  MAXDVSW      0124  11   6  88 102 =
 LONGGYRO   13,2552 203   1 202        ■  LRVELY     10,2642 246   1 257        ■  MAXRATE2  25,2213 591   1 590
 LOOKCDUP   17,2616 484   3 483 484    ■  LRVELZ     10,2640 246   1 257        ■  MAXRATE   25,2212 591   2 589 590
 LOOKLOOP   06,2527 443   1 443        ■  LST1       E3,1400  18  40  28 388    ■  MAXTEST   00,2507  92   4  91 104
 LOOKTOP    06,2523 443   2 432 443    ■  LST2       E3,1410  18  36 142 157    ■  MAXTJET   25,2030 588   1 590
 LOOP       15,2074 371   1 371        ■  LST2CADR   05,2132 305   1 305        ■  MAXTRIES  10,2350 238   1 238
 LOOPCTR    E6,1524 537   3 594 595    ■  LST2CON    05,2131 305   1 305        ■  MAYNOJET  25,2175 591   1 590
 LOOPTEST   26,2673 617   1 617        ■  LST2FAN    11,2000 258   1 305        ■  MCOMPT    23,3067 555   3 549 551
 LOOPTOP    24,3073 577   1 578        ■  LSTEMPTY   04,3534 362   1 362        ■  MCOMPTQR  24,2711 572   1 572
 LOOSE      21,2255 518   1 518        ■  LSTFULL    04,3536 362   3 359 360    ■  MD1          5241 356   1 343
 LOPDELOP   17,3262 492   1 492        ■  LSTPTR        0130  11   4 359      = ■  MEASMODE  E4,1600  20   1 354      =
 LOPTY      15,3573 430   1 430        ■  LTHD+2     11,2203 262   1 262        ■  MEASQ     E4,1574  20   2 348 353 =
 LOS1       E5,1600  23   3 447 470  = ■  LTHVACA    12,2413 159   4 157        ■  MESSAGE   11,2740 276   1 275
 LOS2       E5,1606  23   3 448 470  = ■  LTIMEON    06,2277 437   2 437        ■  METERADD  14,3350 466   1 469
 LOSCALAR      0004  26   3 473      = ■  LV            0044   8   2 101 102  = ■  METEROUT  12,2625 165   1 166
 LOSVEC     E5,1530  22   2 477 478    ■  LVBUF         7677  77   1  64        ■  MG2       13,2726 207   1 207
 LOTSTALL   13,2712 207   -   -   -  = ■  LVELBIAS   10,3167 253   1 249        ■  MGC       E5,1504  22   2 404 411
 LOW10         6426  47  18  29 377    ■  LVSQUARE      0042   8   2 101 105  = ■  MID5         5225 356   1 321
 LOW11         5234 356   9 162 468    ■  LVWTLIST      4547 139   1 142        ■  MID6      05,3402 341   2 341 343
 LOW2          6165  77   1  84      = ■  LXA        01,2010 116   1  43        ■  MIDEXIT   E4,1602  20   -   -   -  =
 LOW3          7663  77   1  81      = ■  LXC        01,2014 116   1  43        ■  MIDFLAG      0002   9   -   -   -  =
 LOW4          7673  76   1 120        ■  L,PVT-CG   E6,1526 538   1 559        ■  MIDSIX       5106 330   2 330 340
 LOW5          5224 356  13 148 333    ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  MIN+      13,2473 202   1 201
 LOW6       05,3401 341   3 328 341    ■  M11        E6,1404 535   5  27 551    ■  MINIMP    11,3122 279   1 258
 LOW7          6027  35   6  35 204    ■  M21        E6,1405 535   4 182 626    ■  MINIMPDB  E6,1647 540   6 187 634 =
 LOW7+2K       6230  41   2  40        ■  M22        E6,1401 535   7 181 626  = ■  MIN-      13,2606 204   1 201
 LOW8          5235 356  11 198 636    ■  M31        E6,1406 535   4 181 626    ■  MINRA     E6,1452 536   -   -   -
 LOW9          7672  76   8 129 223    ■  M32        E6,1403 535   6 182 626  = ■  MINRASQ   E6,1453 536   -   -   -
 LOWFOUR    17,3674 498   1 479        ■  MAGLESS       4775 227   -   -   -    ■  MINTADR   24,2713 573   1 565
 LOWIDCOD   15,2000 370   1 371        ■  MAGSUB        4763 227   9 228 250    ■  MINTJET   24,2243 566   1 573
 LOWVERB    05,2030 303   1 304        ■  MAINBRCH   25,2116 589   1 588        ■  MINUS1       7667  76   1 202      =
 LPHASE5    15,2216 374   1 373        ■  MAJ+       13,2476 202   1 201        ■  MINUSU    24,3232 580   1 579
 LQPL       11,2376 267   1 267        ■  MAJ-       13,2611 204   1 201        ■  MINUSV    24,3345 581   -   -   -
 LRALT      10,2636 246   1 257        ■  MAKECADR      4112  30   4 207 453    ■  MISALIGN  14,3123 463   1 454
 LRCYCLE    11,2456 270   1 270        ■  MAKESURE   10,3214 254   1 254        ■  MISCJUMP     6275  43   2  40
 LRHEIGHT   10,3010 249   1 248        ■  MAKEXSMD   14,2325 451   1 444        ■  MIXAD     05,2235 307   1 307
 LRPOS2     10,3172 254   1 260        ■  MARKRUPT   13,3161 222   2  27  28    ■  MIXBR        0124  11  13 304 347 =
 LRPOS2K    11,2126 260   1 258        ■  MARKSTAT      0374  15  43 158 448    ■  MIXCON    16,2036 347   1 347
 LRPOSCAL   11,2474 270   2 269        ■  MASKCHK    20,2620 386   -   -   -    ■  MIXNN1    05,2211 307   1 307
 LRPOSCHK   10,2736 248   -   -   -    ■  MASKREG    E5,1670  23   3 480      = ■  MIXNN2    05,2223 307   1 307
 LRRATIO    10,3166 253   2 252        ■  MATINC        0124  11   8  11  68    ■  MIXNOUN   05,2176 307   1 304
 LRTSTDEX   11,2444 269   1 269        ■  MATXDET    14,2234 448   -   -   -    ■  MIXTEMP      0111  11   3 301 307 =

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                                       ■                                        ■
MKALARM   13,3055 219     1 219       ■ MP++      20,2442 384     -   -   -   ■ NBDX      E3,1440  18     4  18 216
MKCHEK    13,3044 219     -   -   -   ■ MP+-      20,2445 384     -   -   -   ■ NBDY      E3,1441  18     2 212 216
MKDEX        0077 226     3 225     = ■ MPAC         0140  12   589  48 530   ■ NBDZ      E3,1442  18     2 212 216
MKJOB     13,3333 225     1 225       ■ MPAC+     00,2403  90     2  88       ■ NBPOS     E5,1536  22     4 482 496
MKOUT     13,3146 220     1 220       ■ MPAC-     00,2377  88     2  88       ■ NBPOSPL   17,3344 493     3 475 483
MKREJ     13,3361 225     1 222       ■ MPACSHR   00,2014  78     2  86 105   ■ NBSM2     15,2522 408     -   -   -
MKRELEAS  13,3014 218     3 447 459   ■ MPACSRND  00,2031  79     1  78       ■ NBSM      15,2517 408     8 420 490
MKRUPTBB     4060  28     1  27       ■ MPACVBUF     7506  72     2  68 101   ■ NBSMBIT      0004   9     3 407 409 =
MKVAC     13,2763 218     1 218       ■ MPAGAIN   20,3553 398     1 398       ■ ND1          5240 356     4 298 336
MKVACFND  13,2777 218     5 218       ■ MPCHK     20,2433 384     -   -   -   ■ NDCMPTST  05,2417 313     1 313
MKVB53    13,3036 219     1 219       ■ MPHIGH1   20,3535 397     1 397       ■ NDX+SU    20,2627 387     -   -   -
MMCHANG   05,3267 335     1 306       ■ MPHIGH2   20,3570 398     1 398       ■ NDXCTR    E5,1537  22    26 445 489
MNKEYIN      0015  26     1 285     = ■ MP-+      20,2453 384     -   -   -   ■ NEARONE   15,3171 419     1 417
MNTRCS    12,3765 636     1 636       ■ MP--      20,2461 384     -   -   -   ■ NEG0         7666  76     2 163 377
MODABORT  13,2741 207     2 207       ■ MPNMBRS   20,3516 397     3 379 397   ■ NEG12     00,2273  86     3  85 105
MODE2CHK     5025 228     1 228       ■ MPTEMP       0121  11    59  30 115   ■ NEG180    04,2760 325     1 325
MODE         0147  12    26  35 217   ■ MR12      E6,1400 535     4 182 624   ■ NEG1         7667  76     9  76 624 =
MODEA        0423  16     4 237 424 = ■ MR13      E6,1402 535     3 182 625   ■ NEG1/2       7640  76     6 111 605
MODEB        0425  16     4  16 424   ■ MR13STOR  12,3621 182     1 182       ■ NEG2         7670  76     3 301 474
MODECADR     0371  15     9  15 207   ■ MR22      E6,1401 535     2 535 625   ■ NEG3         7671  76     3 203 482
MODEEXIT  13,2033 190    10 190 218   ■ MR23      E6,1403 535     2 535 625   ■ NEG4         6045  36     2  39 377
MODEGOOD  13,2731 207     1 207       ■ MRATEADD  14,3351 466     1 469       ■ NEG5      05,2077 304     1 304
MODESLP   13,2735 207     1 207       ■ MS100     23,3373 560     1 560       ■ NEG          6727  56     3  56
MODREG       0276  13     6 150 343   ■ MS20F     26,2372 611     4 604 614   ■ NEGANEGB  24,3367 582     1 581
MODROUTB  04,3277 336     1 335     = ■ MS20QR    24,2704 572     -   -   -   ■ NEGAPOSB  24,3254 580     1 579
MONBACK   05,3211 330     1 330       ■ MS30F     26,2373 611     2 614 615   ■ NEGBURG   24,3337 581     1 579
MONBUSY   05,3212 330     1 329       ■ MS30P     23,3072 555     1 543       ■ NEGCSP1   23,3071 555     1 544
MONDEL    05,3157 329     1 329       ■ MS30QR    24,2705 572     1 562       ■ NEGCSP2   24,2721 573     1 563
MONDO     05,3160 329     1 329       ■ MS50QR    24,2706 572     -   -   -   ■ NEGCSP    25,2205 591     2 588 590
MONIT1    05,3101 328     -   -   -   ■ MSGBUSY   11,2775 276     1 276       ■ NEGDRIVE  26,3327 624     1 624
MONITOR   05,3077 328     7 305       ■ MSGCNT    E7,1606  25     9 274 275   ■ NEGFNCT1  26,3154 621     1 621
MONMASK   05,3210 330     1 329       ■ MSGSCAN   11,2642 274     3 274 275   ■ NEGHDAP   25,2070 589     1 588
MONREPOS  12,3531 180     1 180       ■ MSGVN     11,3000 276     1 276       ■ NEG.2     04,2772 325     1 325
MONREQ    05,3134 329     2 328 329   ■ MSUCHK    20,2576 386     -   -   -   ■ NEGMAX       7641  76     4 141 525 =
MONSAVE1     0306  13     7 157 342   ■ MULTEXIT     5421 366     1 366       ■ NEGONE       7667  76     6  45 377
MONSAVE      0305  13     7 157 330   ■ MULTFAIL     5425 366     2 366       ■ NEGOPT    04,2577 315     1 315
MONSTART  14,2065 445     1 445       ■ MULTFLAG  E6,1527 538     5 623 624   ■ NEGPJET0  23,3106 555     1 550
MOONFLAG     0003   9     -   -   - = ■ MXV          7307  67     1  42       ■ NEGPJET1  23,3107 555     1 550
MOREDES   10,2460 241     2 241       ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■   ■ NEGQEROR  24,2365 568     1 568
MOREIDLE  23,3354 560     4 557       ■ NAVKEYIN     0016  26     5 222     = ■ NEGSFE    17,2724 485     1 485
MORNUM    04,2173 296     2 296       ■ NBD2      07,2263 216     1 217       ■ NEGSGN    04,2254 298     1 294
MOSTPASS  26,2014 604     1 610       ■ NBD3      07,2272 216     1 216       ■ NEGSIZ    17,2466 482     1 482
MOVEWGTS  26,2073 605     1 605       ■ NBDONLY   07,2257 216     1 140       ■ NEGTIME   26,3460 628     2 628

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                                    ■                                     ■
NEGTP     23,2521 550    1 550        ■ NODSPLAY  01,3135 403    1 402        ■ NOUNADD      0131  11   24 307 355 =
NEGUQ     E6,1532 538    9 538 629    ■ NODSPOUT  12,2503 163    1 163        ■ NOUNCADR     0304  13    8 304 355
NEGUR     E6,1534 538    3 611 625 =  ■ NOEBANK   20,3162 392    1 393        ■ NOUNREG      0267  13   13 157 347
NEGURGUM  24,3524 584    7 580 584    ■ NOEND     10,3000 249    1 249        ■ NOUNTEM      0106  10    3 307     =
NEGURGVM  24,3524 584    4 581 582 =  ■ NOERR     17,2310 479    2 479        ■ NOUT         0303  13   10 158 403
NEGUSUM   26,3317 624    -   -   -    ■ NOGENWDS  15,2217 374    1 372        ■ NOUTCON      7660  76    1 158     =
NEGXPOLS  25,2242 594    1 594        ■ NOIBNKSW     6016  35    5  73  75    ■ NOVAC2    01,2242 128    1 126
NETZERO      6054  37    1  37        ■ NOIMUMON  12,3752 177    -   -   - =  ■ NOVAC3    01,2245 128    1 129
NEWABORT     5460 367    1 367        ■ NO.CORES  01,2251 128    2 128 133    ■ NOVAC        4363 126   19 140 439
NEWALARM     5430 366    1 366        ■ NO.PJETS  E6,1624 540    3 545 553    ■ NREAD     17,3052 488    -   -   -
NEWDATA   12,2622 165    1 165        ■ NO.QJETS  E6,1620 539    7 539 595    ■ NSAMP        0425  16    3 247 249 =
NEWDLTAV  E4,1414  19    -   -   - =  ■ NO.RJETS  E6,1621 539    6 558 595 =  ■ NSBUGD    17,3445 494    5 495 496
NEWJOB       0067   8   22  35 506    ■ NO.WDS       6164  39    6  39 106    ■ NSFLAGD   17,3443 494    -   -   -
NEWLOC       0072  10    9 126 133 =  ■ NOKILL    20,3475 396    1 397        ■ NSHIFT       1014  17    -   -   -
NEWMODE      6013  35   11  50 426    ■ NOMDNLST  15,2321 376    1 158        ■ NTIMES    E4,1410  21    4 433     =
NEWMODEX     4667 150    7 267 534    ■ NOMINIMP  11,3130 280    1 258        ■ NUCHANGE     4474 137    1 137
NEWNUV    E4,1422  19    -   -   - =  ■ NOMORE    10,2723 248    2 248 253    ■ NUDIRECT     4470 137    1 137
NEWOPS       6023  35    4  34  46    ■ NOMSG     11,2721 275    3 274 275    ■ NULLFILT  24,2000 562    1 562
NEWPHASE     4626 148    -   -   -    ■ NOMTMLST  12,2407 158    1 158        ■ NUM       04,2062 295    9 294 295
NEWPRIO      0070   9    8 126 134 =  ■ NOQBRSM      4612 147    1 160        ■ NUMGRPS      7664 159    2 153 154 =
NEXDLCDU  24,2772 576    2 575 576    ■ NOQJETS   24,2360 568    3 568        ■ NUMSTEP   06,2332 438    -   -   -
NEXT      17,3277 492    1 492        ■ NOQRON    24,2663 572    1 572        ■ NUMTIMES  E4,1511  21    3 438     =
NEXTCALL  25,3313 633    1 632        ■ NOQRSM       4610 147    5  28 614    ■ NVBNKTEM     0326  13    1 340
NEXTCDU   13,2142 193    4 193 195    ■ NORATE    11,3353 369    2 368        ■ NVCODE    E4,1601  20    -   -   - =
NEXTCORE  01,2311 129    2 128        ■ NORESET   13,2437 200    3 200        ■ NVCOM     04,2240 297    1 298
NEXTCYLT  E4,1474  21    1 436     =  ■ NORMALQ   24,2165 564    1 564        ■ NVQTEM       0325  13    3 340 341
NEXTSET   06,2061 433    2 433        ■ NORMATT   25,2237 594    1 594        ■ NVSBBBNK     5122 340    1 340
NEXTTHRT  06,2431 441    2 441 442    ■ NORMGAM   E4,1605  20    -   -   - =  ■ NVSBENDL  04,3307 335    2 335 337
NEXTTIME  E4,1420  21    1 433     =  ■ NORMLOP   21,2116 516    2 516        ■ NVSBWAIT     5332 360   51 219 512
NEXTTRIM  06,2311 438    2 438        ■ NORMLPOL  25,2773 601    1 594        ■ NVSBWT1      5337 360    1 360
NGUBGH    17,3426 494    1 494        ■ NORMQADR  24,2164 564    1 563        ■ NVSUB1    05,3344 341    2 303 340
NINE         7662  76    2 472 526    ■ NORMRETN  25,2057 589    2 588 590    ■ NVSUB        5107 340    5 225 455
NJET      E6,1470 536    3 552        ■ NORMT4       4717 160    1 160        ■ NVSUBB    05,2000 303    1 340
NJETCORR  25,2325 595    1 595        ■ NORMTEST  00,3440 110    -   -   -    ■ NVSUBCOM     5116 340    1 341
NNADTAB   16,2052 348    1 347        ■ NORMURG   24,3625 586    2 586        ■ NVSUBEND     5127 341    4 335 342
NNADTEM      0132  11    8 304 347    ■ NOROOT    25,2170 590    1 590        ■ NVSUBMON     5123 341    3 266 330
NNTYPTAB  16,2152 349    1 347        ■ NORRGMON  12,3545 188    5 178 180 =  ■ NVSUBSY1  04,3476 360    1 294
NNTYPTEM     0133  11    5 313 347    ■ NOSTCHG      4606 638    1 636     =  ■ NVSUBSYB  04,2001 294    1 360
NOBANKNO  20,3437 396    1 395        ■ NOTBIT12  04,2430 300    2 300        ■ NVSUBUSY     5327 360    4 276 455
NOBITS    E5,1576  23    8 466 469 =  ■ NOTORQUE  24,2530 570    -   -   -    ■ NVTEMP       0107  10    8 225 360 =
NOCHORLD  21,2727 526    1 522        ■ NOTRANS   24,2654 572    1 572        ■ NXTBNK    20,3410 395    2 396 397
NODESNB   10,2412 240    1 240        ■ NOTRHC    11,2714 275    1 274        ■ NXTFL33   12,3141 171    7 175
NODESSM   10,2361 239    1 239        ■ NOUN      04,2250 298    1 294        ■ NXTIBT    12,3127 171    3 171

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 SYMBOL H    DEFINITION    REFERENCES F ■ SYMBOL H    DEFINITION    REFERENCES F ■ SYMBOL H    DEFINITION    REFERENCES F
                                        ■                                         ■
 NXTIFAIL   12,2753 168   12 173 174    ■ OFFGIMQ    26,3370 625    1 618        ■ OPJUMP3       6217  41    1  40
 NXTIFBIT   12,2741 168    3 168        ■ OFFGIMR    26,3373 625    1 618        ■ OPJUMP        6032  35    1  35
 NXTNMBR    01,3075 402    2 401 402    ■ OFFTIME    E4,1502  21    1 436      = ■ OPONLY     12,3066 170    1 169
 NXTONOFF   06,2214 436    2 436        ■ OFFTIMER   E4,1505  21    1 437      = ■ OPRTRDLY   16,3174 510    6 501 510
 NXTRCSPR   25,3434 636    3 636 637    ■ OFFTMBUF   E4,1406  21    4 436 437  = ■ OP/INERT   11,2076 259    2 259
 NXTRR1AX   10,2161 234    1 234        ■ OFLOOP     20,3075 390    2 391        ■ OPTCADR       0372  15    2 158 448 =
 NXTRST     12,2150 154    1 154        ■ OGC        E5,1500  22   11 258 533    ■ OPTCOARV   11,2153 264    1 264     =
 NZACCDOT      0066 629    4 628      = ■ OGCADR     14,3667 472    -   -   -    ■ OPTDATA    14,2501 454    3 444 458
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  ■ OGCECADR   16,3357 513    -   -   -    ■ OPTDEGIN   04,3006 325    1 324
 OBEYQRRC   24,2352 567    2 567 592    ■ OGCPL      17,3673 498    1 490        ■ OPTMSTRT   21,2764 527    1 159
 OBEYRAPE   23,2424 548    1 592        ■ OGCZERO    14,2727 459    3 444 526    ■ OPTNREG    E5,1617  23    2 474 482 =
 OBEYRATE   23,2421 548    1 548        ■ O-UFLOW    20,3072 390    -   -   -    ■ OPTRDRIN   14,2524 454    1 462
 OCT04012   12,2450 159    1 151        ■ OKDESNB    10,2371 240    1 240        ■ OPTSTALL   13,2714 207    2 447 448 =
 OCT10001   12,3472 178    2 178        ■ OKDESSM    10,2330 237    1 239        ■ OPTX          0036   7    1 231     =
 OCT1107    12,2206 154    1 154        ■ OKT30      11,2727 275    2 275 281    ■ OPTXCMD       0054   8    1 166     =
 OCT11         7662 472    1 467      = ■ OLDATAGD      0427  16    5 247 376  = ■ OPTY          0035   7   11 180 430 =
 OCT12         7661 472    1 467      = ■ OLDBT1        1110  17    -   -   -  = ■ OPTYCMD       0053   8    2 166 235 =
 OCT1400       5236 356    2 355        ■ OLDDATA    12,2602 165    1 165        ■ OPTYHOLD      0417  16    3 248 376
 OCT140     13,3426 226    1 222        ■ OLDWFORQ   E6,1644 540    3 187 631    ■ OUTO          0010  26    3 160 163 =
 OCT15000      4514 177    1 176      = ■ OLDWFORR   E6,1645 540    2 187 631  = ■ OUTLINK       0057   8    -   -   - =
 OCT15      12,3424 177    1 176        ■ OLDXFORP   E6,1431 535    6 535 558    ■ OUTNEG     17,2646 484    1 484
 OCT1700    12,3432 177    1 174        ■ OLDYFORP   E6,1432 535    3 543 558  = ■ OUTPLUS    17,2635 484    1 484
 OCT1720    12,3431 177    1 175        ■ OLDYFORQ   E6,1433 535    4 558 617  = ■ OVCON      20,2010 377    1 388
 OCT176     00,2107  81    2  87        ■ OLDZFORQ   E6,1434 535    3 558 562  = ■ OVERFLOW      7007  58   14  57  82
 OCT20002   12,3544 180    1 180        ■ OMEGA.K       0065 538    8 621 622  = ■ OVFIND        0105  10   20  60 357
 OCT23         6227  41    1  39        ■ OMEGAP     E6,1416 535   14 535 589    ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
 OCT27      14,3642 471    1 471        ■ OMEGAPD    E6,1426 535    5 535 575    ■ P+2JET     23,2676 553    2 550
 OCT30      16,3344 513    1 509        ■ OMEGAQ     E6,1417 535   18 187 631  = ■ PAC        E5,1476  22    -   -   -
 OCT32002   12,3543 180    1 180        ■ OMEGAQD    E6,1427 535    3 558 578  = ■ PACT2      12,2161 154    1 154
 OCT34      13,3425 226    1 222        ■ OMEGAR     E6,1421 535   16 187 631  = ■ PACTIVE    12,2177 154    1 154
 OCT37737   12,3204 172    1 172        ■ OMEGARD    E6,1430 535    4 558 578  = ■ PASTEVB       5100 330    1 330
 OCT3          6165 226    2 219 220  = ■ OMEG/MS    14,3701 472    2 453 474    ■ PAXADIDL   23,3367 560    1 560
 OCT40001      6042  36    4  77 367    ■ ONE           7657  76  160  50 632  = ■ PAXCALL    25,2067 589    1 589
 OCT40400      5445 366    2 366        ■ ONE-K      23,3066 555    1 544        ■ PAXFILT    23,2146 544    2 542
 OCT50001   01,2722 144    1 141        ■ ONETOTWO   26,2302 609    3 608 615    ■ PAXIS      23,2055 543    3 560 611
 OCT50K     11,2631 273    1 273        ■ ONTIME     E4,1477  21    1 437      = ■ PAXISADR   26,2376 611    -   -   -
 OCT54      12,3426 177    1 170        ■ OPCHK1     17,2337 480    -   -   -    ■ PAX/FILT   26,2070 605    4 604 614
 OCT55000   05,3523 365    1 364        ■ OPCHK2     17,2340 480    1 480        ■ PBIASX     E3,1432  18    1  18
 OCT70000   23,3405 561    1 542        ■ OPCHK      17,2245 479    2 267 479    ■ PBIASY     E3,1434  18    -   -   -
 OCT70K     11,2633 273    1 273        ■ OPCHKPOS   17,3524 496    1 493        ■ PBIASZ     E3,1436  18    -   -   -
 OCT71000   12,3433 177    1 174        ■ OPDEGIN2   04,3013 325    -   -   -    ■ PBODY      E4,1627  20    -   -   -
 OCT75      12,3427 177    2 176        ■ OPDEGOUT   04,2563 315    1 315        ■ PCLOOP     12,2131 153    2 153 154
 OCTBACK    05,3250 333    1 335        ■ OPJUMP2       6167  40    1  35        ■ PCOM       E6,1435 536    5 275 369

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                                         ■                                        ■
  PDA           0026  22    -   -   -  = ■ PIT       14,3433 467     1 468        ■ POSLOAD   14,2015 444     -   -   -
  PDDL          6527  51    1  42        ■ P-2JET    23,2700 553     2 550        ■ POSMAX       7637  76    41  66 633
  PDVL          6563  52    1  42        ■ P-RHCCTR     0043 536     4 547 567  = ■ POSN10    17,3553 496     1 493
  PERFORM    06,2376 439    1 439        ■ PJETSNOT  23,2471 549     1 549        ■ POSN11    17,3564 496     1 493
  PERROR     E6,1476 536    7 542 557    ■ PJUMPADR  E6,1613 539     4 544 558    ■ POSN1     17,3422 494     1 493
  PFAILOK2   13,2257 196    1 196        ■ PLENTY    10,2730 248     1 248        ■ POSN2     17,3431 494     1 493
  PFAILOK    13,2262 196    1 170        ■ PLETRUPT  23,2277 546     2 546        ■ POSN3     17,3436 494     1 493
  PFILTADR   E6,1601 539    4 543 617    ■ PLUSU     24,3372 582    -   -   -     ■ POSN4     17,3450 494     1 493
  PFRPTLST   E6,1603 539   10 604 610    ■ PLUSV     24,3277 580     1 580        ■ POSN5     17,3460 495     1 493
  PHASCH2       4634 148    1 148        ■ POINT=90  26,2371 611     1 610        ■ POSN6     17,3470 495     1 493
  PHASCHNG      4614 148   10 476 525    ■ POLADR    24,3464 583     1 583        ■ POSN7     17,3500 495     1 493
  PHASE0        1072  17    2 151 154    ■ POLFND    25,2301 595     1 595        ■ POSN8     17,3513 495     1 493
  PHASE1        1074  17    2 151 527    ■ POLISH       0103  10    20  10 122    ■ POSN9     17,3542 496     1 493
  PHASE2        1076  17    1 151        ■ POLLEY       4251 123     2 123        ■ POSNJUMP  14,2576 456     2 444 460
  PHASE3        1100  17    1 151        ■ POLLOOP   25,2257 594     1 595        ■ POSNV     E5,1654  24     2 518      =
  PHASE3A    15,2134 372    1 372        ■ POLRELOC  E6,1523 537    14 583 595    ■ POSPJET0  23,3110 555     1 550
  PHASE4        1102  17    1 151        ■ POLTAB1   25,2364 596     4 594 595    ■ POSPJET1     7664 555     1 550      =
  PHASE4A    15,2161 372    1 373        ■ POLTAB2   25,2564 599     2 595        ■ POSQEROR  24,2416 568     1 568
  PHASE5        1104  17    1 151        ■ POLTEST   E6,1525 537    -   -   -     ■ POSSFE    17,2726 485     1 485
  PHASE5A    15,2174 373    1 373        ■ POLTYPE   24,3460 583    15 579 583    ■ POSTAND   11,3210 283     1 258
  PHASEXIT      4655 149    1 148        ■ POLTYPEP  25,2216 594     1 583        ■ POSTIME   26,3466 628     2 628
  PHIV       E4,1466  20    -   -   -  = ■ POLY2        7225  65     1  65        ■ POSTJUMP     4102  29    22 169 471
  PINACT     12,2172 154    1 154        ■ POLY         7202  64     2 112 114    ■ POSTPFIL  26,2401 611     3 610 615
  PIPI       14,2106 445    2 445 446    ■ POLYCNT      0124  11     4  64  65  = ■ POSTQRFL  26,2745 618     1 617
  PIP2       14,2111 445    1 446        ■ POLYCOM      7212  64     1  64        ■ POSXPOLS  25,2245 594     1 594
  PIP2ADR    14,2134 446    3 445 446    ■ POLYLOOP     7222  65     1  65        ■ POWRSERS     7175  64     -   -   -
  PIPABIAS   E3,1432  18    1 211      = ■ POLYRET      0125  11     3  64  65  = ■ PRATECOM  E6,1441 536     3 548
  PIPACHK    17,2106 476    1 475        ■ POS1      14,2610 456     1 456        ■ PRATEDIF  E6,1472 536     5 549 550
  PIPANO     E5,1540  22    6 487        ■ POS1/2       7642  76     2 141      = ■ PREDOT       7134  63     2  67  70
  PIPASC     21,3363 533    1 517        ■ POS2      14,2615 456     1 456        ■ PREGBSY      5312 359     3 359 486
  PIPASCF    E3,1433  18    1 211      = ■ POS3      14,2633 456     1 456        ■ PRELMTRX  E5,1720  24     2  24 530 =
  PIPASCFX   E3,1433  18    1  18        ■ POS4      14,2654 457     1 456        ■ PREMTRXC  E5,1717  24     3 522 534 =
  PIPASCFY   E3,1435  18    -   -   -    ■ POS4P     23,2573 551     1 551        ■ PRENVBSY     5324 360     1 360
  PIPASCFZ   E3,1437  18    -   -   -    ■ POS5      14,2706 458     1 456        ■ PREROOT   25,2154 590     1 591
  PIPAX         0037   7   17 197 515  = ■ POSANEGB  24,3342 581    -   -   -     ■ PRESINE   00,3454 111     2 111
  PIPAY         0040   7    7 197 515  = ■ POSAPOSB  24,3202 579    -   -   -     ■ PRESTAND  11,3142 281     1 258
  PIPAZ         0041   7    8 197 515  = ■ POSARG       4303 124     1 124        ■ PRESTORE     6421  47     1  47
  PIPFAIL    12,3311 174    1 177        ■ POSBURG   24,3177 579    -   -   -     ■ PRIO10       7643 138     -   -   -  =
  PIPFREE2   13,2300 197    1 197        ■ POSDRIVE  26,3331 624     1 624        ■ PRIO11       4510 138     -   -   -
  PIPFREE    13,2303 197    -   -   -    ■ POSFNCT1  26,3152 621     1 621        ■ PRIO12       4511 138     -   -   -
  PIPINDEX   E5,1541  22   17 445 495    ■ POSGMBL   17,3077 489     3 475 483    ■ PRIO13       4512 138     -   -   -
  PIPNDX     E5,1542  22    8 445 457    ■ POSGN     04,2267 298     1 294        ■ PRIO14       4513 138     -   -   -
  PIPUSE     13,2266 197    -   -   -    ■ POSITON   E5,1544  22    15 444 510    ■ PRIO15       4514 138     2 177 364

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                                    ■                                     ■
PRIO16       4515 138   4 177 364   ■ PUTCOM2   05,3040 323   4 323 325   ■ R1D1         5175 355   9 299 338
PRIO17       4516 138   1 219       ■ PUTCOM    05,2762 322   8 319 320   ■ R2D1         5176 355   3 299 332
PRIO1        7646 138   -   -   - = ■ PUTDCSF2  05,3064 324   1 324       ■ R3D1         5177 355   3 299 308
PRIO20       7642 138  11 264 527 = ■ PUTDECSF  05,3051 323   2 323       ■ R+Q+CHKR  24,2433 569   1 568
PRIO21       4517 138   1 445       ■ PUTDPCOM  05,3014 323   1 323       ■ R+Q-CHKR  24,2402 568   1 568
PRIO22       4520 138   1 234       ■ PUTINLST  04,3472 359   2 359 360   ■ R+,CHKDB  24,2445 569   1 568
PRIO23       4521 138   -   -   -   ■ PUTNORM   05,3023 323   1 322       ■ RACCDOT   E6,1544 538   2 625     =
PRIO24       4522 138   -   -   -   ■ PUTPOSX   14,2247 449   2 444 460   ■ RACTCADR  12,2415 159   1 154
PRIO25       4523 138   2 256 271   ■ PUTSFNOR  05,3063 324   1 324       ■ RADAREAD  10,2707 248   2  28
PRIO26       4524 138   1 241       ■ PUTXY     05,2602 319   -   -   -   ■ RADCADR      0373  15   1 158     =
PRIO27       4525 138   1 276       ■ PUTXYZ    05,2550 319   -   -   -   ■ RADCK     17,2402 481   1 492
PRIO2        7645 138   1 396     = ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ RADECNTR  16,2777 505   1 503
PRIO30       4526 138   3 272 437   ■ Q            0002   7 309  29 641 = ■ RADIN     10,3060 250   1 250
PRIO31       4527 138   -   -   -   ■ Q+NORJTS  24,2425 568   3 568 569   ■ RADMODES     0413  16  78  28 424
PRIO32       4530 138   2 218 225   ■ QACCDOT   E6,1542 538   4 624 628 = ■ RADNOOP   10,3227 254   2 236 254
PRIO33       4531 138   -   -   -   ■ QDIFF     E6,1477 538   8 578 619 = ■ RADSAMP   10,3254 256   2 256 270
PRIO34       4532 138   1 156       ■ QERRCALC  24,3025 576   1 575       ■ RADSTALL  13,2712 207   9 207 504
PRIO35       4533 138   3 140 439   ■ QERROR    E6,1477 536   4 538 618   ■ RANDCHK   20,3016 389   -   -   -
PRIO36       4534 138   -   -   -   ■ Q-NORJTS  24,2374 568   3 568       ■ RATE      23,2701 553   3 551 553
PRIO37       4535 138   2 153 366   ■ Q-RHCCTR     0042 536   4 548 567 = ■ RATEDIF   E6,1443 536   6 568 592
PRIO3        4504 138   2 226       ■ QJUMPADR  E6,1614 539   3 563 571   ■ RATEDONE  23,2334 547   3 547
PRIO4        7644 138   -   -   - = ■ QMANDACC  E6,1665 541   8 541 634   ■ RATEDSP   16,3071 507   1 507
PRIO5        4505 138   -   -   -   ■ QPLAC     E5,1545  22  15 455 512   ■ RATESMAL  24,2306 567   1 566
PRIO6        4506 138   2 235 377   ■ QPLACE    E5,1546  23  61 267 511   ■ RATIO     E6,1457 536   -   -   -
PRIO7        4507 138   -   -   -   ■ QPLACES   E5,1547  23   6 453 530   ■ RAVEGON   E4,1514  20   -   -   - =
PRIOCH2   01,2463 134   1 127       ■ QPRET        0052   8   3  54 119 = ■ RCM4JETS  23,2537 550   1 549
PRIOCHNG     4430 127   -   -   -   ■ QRATEDIF  E6,1424 535   6 566 592 = ■ RCOM      E6,1436 536   2 369
PRIORITY     0153  12  26 128 157   ■ QRAXIS    24,2002 562   1 614       ■ RCSCNTRL  26,2723 617   3 617
PROCTNON  12,2770 169   1 168       ■ QRCNTR       0073 538  27 544 624 = ■ RCSFJUMP  25,3445 637   1 636
PROGLARM     5440 366   2 366 367   ■ QREADY    E4,1573  20   -   -   - = ■ RCSMNTR   25,3416 636   1 636
PSIV      E4,1474  20   -   -   - = ■ QRERAS       0073 626   6 626     = ■ RCSMONIT  12,3752 636   2 167 177
PSKIPADR  23,3113 556   1 553       ■ QR.1STOQ  E6,1623 540   3 558 571   ■ RCV       E4,1430  19   -   -   - =
PTBAD     12,2203 154   4 153 154   ■ QR-JETLW  24,3643 587   1 587       ■ RDBADEND  10,3251 255   5 240 255
PTDTRDE   14,3447 468   2 466       ■ QRJPFILT  26,2746 618   1 617       ■ RDES      E3,1461  19   3 234
PTERM     12,2156 154   -   -   -   ■ QRNDXER      0065 629   7 628 629 = ■ RDESGAIN  10,2635 245   1 244
PTITRDE   14,3422 467   1 466       ■ QRTORQUE  24,2113 564   2 563 564   ■ RDIFF     E6,1500 538   4 615 619 =
PTORQUE   23,2167 545   2 545       ■ QRUPT        0012   7  14  27 615 = ■ RDOTBIAS  10,3170 253   1 250
PULSEIMJ  15,3515 429   2 450 453   ■ QTRANSF   26,3421 626   3 615 616   ■ RDR1      14,3070 462   1 472
PURGENCY  23,2617 551   2 545 547   ■ QTSN45    15,3027 416   1 406       ■ RDR37511  14,3062 462   1 445
PUSH      00,3177 106   1  44       ■ QUARTER      7643  76   4 110 115 = ■ RDRDFREE  11,2441 269   -   -   -
PUSHLOC      0152  12  28  39 130   ■ QUITLOOK  E4,1654  22   2 443     = ■ RDRINIT   14,3120 462   1 267
PUSHUP       6135  39   1  36       ■ QURGENCY  24,3141 578   -   -   -   ■ RDRLOCS   10,3333 257   1 257
PUTADD    05,2307 308   3 308       ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■ RDRPTBB      4062  28   1  27

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                                     ■                                      ■
RDRRETN   14,3674 472   1 462        ■ REQMM     05,3302 336   1 335        ■ RMAG         1032  17   -   -   -
RDSP      E5,1570  23   -   -   -  = ■ REQRET       0300  13   9 157 336    ■ RMAGSQ       1034  17   -   -   -
READCDUS  15,3361 425   2 237 242    ■ REQUESTC  05,3325 336   1 337        ■ RMANDACC  E6,1666 541   3 579 634  =
READCHK   20,2774 389   -   -   -    ■ RERRCALC  24,3044 577   -   -   -    ■ RMODINIT  12,2437 159   1 158
READOUT   17,2355 480   1 480        ■ RERROR    E6,1500 536   4 538 618    ■ RMODINV   10,2142 233   7 233 240
READPIPS  15,3370 425   1 425        ■ RESAMPLE  10,3001 249   1 253        ■ RN1          1054  17   -   -   -
RECAL1    04,3430 343   2 343        ■ RESHIFT   26,3267 623   1 624        ■ RN           1000  17   -   -   -
RECAL2    04,3441 344   2 344        ■ RESTEST1  21,2571 522   1 527        ■ RNRAD        0046   7   4 249 250  =
RECAL3    04,3446 344   1 343        ■ RESTEST3  21,2600 522   1 528        ■ ROADBACK  10,2302 236   5 236 254
RECALTST  04,3422 343   2 321 337    ■ RESTORE1  20,2177 380   -   -   -    ■ ROLL      E3,1471  19   -   -   -
REDO      11,2332 267   1 267        ■ RESTORE2  20,2225 381   -   -   -    ■ ROOT1/2   17,3677 498   5 495 496
REDOCTR      1362  18   2 153 376  = ■ RESTORE3  20,2253 381   -   -   -    ■ ROOT1SQ   17,3700 498   1 496
REDUCEP   24,3703 592   1 592        ■ RESTORE   17,3055 488   2 488 489    ■ ROOT2SQ   17,3701 498   1 496
REDUCEQR  24,3672 592   1 584        ■ RESTOREA  17,3063 489   8 487        ■ ROOT3SQ   17,3702 498   1 496
REDUCERA  24,3666 592   1 585        ■ RESTORSR  07,2461 287   2 286        ■ ROOTBCK      4336 124   1 124
REDUCESC  24,3715 593   2 592        ■ RESULTCT  E5,1673  23  14 476 489  = ■ ROOTRET      1106  17   8  17 125
REDYTORK  14,3703 474   1 483        ■ RESUME       4606 147  41  28 638    ■ ROPECHK   20,3307 394   3 379 396
REGRSAMP  11,2407 269   1 258        ■ RETNON    12,3012 169   1 169        ■ RORCHK    20,3002 389   -   -   -
REGSLEEP  13,2367 199   1 199        ■ REVCNT       6162  39   2  39  76    ■ ROTVB24   13,3130 220   3 220
REGUP        6153  39   3  39        ■ RFAILCNT  E7,1436  25   3 256 375    ■ ROUND     00,2077  80   1  44
REJALARM  13,3376 226   1 225        ■ RFAILS2   05,3522 365   1 364        ■ ROUNDSUB     7116  62   4  73  86
REJECT2   13,3414 226   3 225 226    ■ RFAILS    04,2427 300   1 299        ■ RR1AX2    10,2163 234   1 234
REJECT    13,3401 226   1 226        ■ RGOODEND  10,3244 255   4 249 255    ■ RR1AXIS   10,2155 234   1 234
REJIN     13,3372 226   1 225        ■ RHCACTIV  24,2317 567   1 566        ■ RRANGLES  15,3267 423   1 237
RELDSP1      5364 361   2 328 344    ■ RHCMON    11,2733 275   1 275        ■ RRATEDIF  E6,1425 535   9 567 592  =
RELDSP2      5354 361   3 361        ■ RHCMONVN  11,2737 275   1 275        ■ RRAUTCHK  12,3440 178   2 164
RELDSP       5341 361   4 305 337    ■ RHCMOVED  23,2346 547   1 547        ■ RRCDUCHK  12,3501 179   3 178
RELDSPON     5253 357   2 330 360    ■ RHCNTRL   11,3264 368   2 275 369    ■ RRDESDUN  10,2616 245   1 245
RELRET       0130  11   3 361      = ■ RHCP         0042   7   2 368      = ■ RRDESK2   11,2256 264   1 264
RELTAB11     4754 160   1 162        ■ RHCR         0044   7   2 368      = ■ RRDESNB   10,2363 240   3 264 504
RELTAB       4741 160   4 163 332    ■ RHCSCALE  11,3360 369   3 368 369    ■ RRDESNBK  11,2234 264   1 259
RELWORK      6210  40   1  40        ■ RHCY         0043   7   2 368 369  = ■ RRDESSM   10,2306 237   1 462
REMARK    13,3315 225   5 223 226    ■ RIGHT5       5200 355   5 321 341    ■ RRECT     E4,1400  19   -   -   -  =
REMODE    10,2115 233   1 241        ■ RIGHT     00,2216  85   1  87        ■ RRGIMON   12,3521 180   1 179
RENDRAD   10,3014 249   1 248        ■ RIGHTGTS  21,2714 525   1 525        ■ RRIMUDIF  11,2107 259   1 259
REPOSRPT  10,2074 232   1 234        ■ RIGHT-    00,2312  87   1  84        ■ RRINDEX   E3,1462  19   3 234
REQADD    05,2055 304   1 304        ■ RIGHTR    00,2012  78   1  86        ■ RRLIMCHK     4777 228   5 180 240
REQCOM    05,2257 308   2 308        ■ RIG-4SEC  E4,1530  20   -   -   -  = ■ RRLIMOK      5035 228   1 228
REQDATX   05,2252 308   3 319 320    ■ RIGNTION  E4,1400  19   -   -   -  = ■ RRNB      15,3243 422   1 240
REQDATY   05,2254 308   3 319 320    ■ R-Q+CHKR  24,2440 569   1 568        ■ RRNBSW       0011   9   3 237 242  =
REQDATZ   05,2256 308   3 304 320    ■ R-Q-CHKR  24,2407 568   1 568        ■ RROFF     12,3473 178   1 178
REQEX1    05,3321 336   1 336        ■ R-RHCCTR     0044 536   4 548 567  = ■ RROPRDLY  16,3167 510   2 504
REQEXLOC  05,2166 305   -   -   -    ■ R-,CHKDB  24,2456 569   1 568        ■ RROUT2    10,2215 235   1 235

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                                        ■                                       ■
 RROUT     10,2213 235    2 234 245     ■ RUPTREG1      0074  10   26 149 538   ■ SAUTLOCS  14,3336 466    1 466
 RROUTLIM  10,2241 235    1 235         ■ RUPTREG2      0075  10   27 149 538   ■ SAUTOIFS  14,3324 466    1 267
 RRRANGE   10,2650 246    1 257         ■ RUPTREG3      0076  10   13  32 589   ■ SAVE      E5,1620  23   15 482 485 =
 RRRATFPS  16,3004 505    1 504         ■ RUPTREG4      0077  10   18  10 538   ■ SAVERATE  24,2753 575    -   -   -
 RRRDOT    10,2646 246    1 257         ■ RUPTSTOR      0070   9    8 222 223 = ■ SBIT10       7646 377    -   -   -  =
 RRRET     E3,1460  19    5 227 234     ■ RURGENCY  24,3125 578    -   -   -    ■ SBIT11       7645 377    2 394 395 =
 RRSCALUP  10,2557 244    1 244         ■ RUTMXTAB  16,2475 354    1 347        ■ SBIT12       7644 377    2 394 398 =
 RRSIM2    15,3524 430    -   -   -     ■ RUTMXTEM      0137  12    2 321 347   ■ SBIT13       7643 377    -   -   -  =
 RRSIM     15,3522 430    2 430         ■ RV33      11,2523 271    2 271 277    ■ SBIT14       7642 377    6 385 399 =
 RRSIMG    15,3574 430    2 430         ■ RVQ       00,3224 106    1  44        ■ SBIT15       7641 377    2 381 395 =
 RRSONLY   10,2153 234    2 232 233     ■ RWAITK    11,2122 260    2 260 264    ■ SBIT1        7657 377    -   -   -  =
 RRSPGAIN  10,2212 234    1 234         ■ RXORCHK   20,3032 390    -   -   -    ■ SBIT2        7656 377    -   -   -  =
 RRTARGET      0415  16   4 237 462 = ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ SBIT3        7655 377    -   -   -  =
 RRTONLY   10,2150 234    3 232 233     ■ /AGREE    00,2725 100    1  99        ■ SBIT4        7654 377    1 393      =
 RRTURNON  10,2000 230    1 178         ■ /BUF+     00,2637  98    2  97        ■ SBIT5        7653 377    -   -   -  =
 RRUSE         0010   9   -   -   -   = ■ /BUF-     00,2633  97    2  97        ■ SBIT6        7652 377    -   -   -  =
 RRUSEFLG      7651 236   4 230 459 =   ■ /MPAC+    00,2714  99    2  99        ■ SBIT7        7651 377    1 395      =
 RRZ2      10,2304 236    1 236         ■ /MPAC-    00,2710  99    2  99        ■ SBIT8        7650 377    -   -   -  =
 RRZERO    10,2247 236    4 260 503     ■ /NORM2    00,2652  98    1  98        ■ SBIT9        7647 377    2 380 393 =
 RRZEROK   11,2117 260    1 259         ■ /NORM     00,2657  98    1  98        ■ SBLANKS   01,3051 402    1 403
 RRZEROS3  10,2013 231    2 230 236   ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ SBNK03       4506 377    1 394      =
 RSAMPDT   E7,1435  25    5 256 271     ■ S10BITS       6426 377    2 391 392 = ■ SBNKOPTN  01,3000 401    1 378
 RSAMPTST  11,2411 269    1 269         ■ S11CHAN   01,3033 401    2 402 403    ■ SBUSY     20,3513 397    1 396
 RSEMIAUT  11,2475 271    1 269         ■ S13BITS   20,2006 377    9 385 399    ■ SCADR     20,3442 396    1 397
 RSTACK    E7,1437  25   53 256 375     ■ S1            0050   8   17 117 523 = ■ SCALADJ   10,3111 252    1 250
 RSTGTS1   21,2002 514    1 527         ■ S2            0051   8   13 404 491 = ■ SCALCHNG  10,3077 251    1 250
 RSTKLIST  11,2472 270    1 269         ■ S8BITS        5235 377    1 380     = ■ SCALDELT  E4,1611  20    -   -   -  =
 RSTKLOC   E7,1434  25    7 256 269 =   ■ S+1           7657 377   25 380 403 = ■ SCALEA    E4,1606  20    -   -   -  =
 RTB       01,2070 118    1 118         ■ S+2           7656 377    7 381 390 = ■ SCALEB    E4,1607  20    -   -   -  =
 RTB/BHIZ  01,2067 118    1  43         ■ S+3           6165 377    4 379 389 = ■ SCALECHK  10,3050 250    1 249
 RTERMCAD  12,2423 159    1 154         ■ S+4           7655 377    1 390     = ■ SCALEDT   E4,1610  20    -   -   -  =
 RTJETADR  24,2734 573    1 567         ■ S+5           7664 377    2 382 389 = ■ SCALER    E4,1612  20    -   -   -  =
 RTJETIME  24,2467 569    1 573         ■ S+6           6162 377    1 390     = ■ SCALFTR   14,3677 472    1 454
 RTRANSF   26,3431 626    3 615 616     ■ S+7           7663 377    2 378 386 = ■ SCALSAV   E3,1504  19    4 281 283
 RTSTBASE  E7,1433  25    3 256 270     ■ S+MAX     20,3431 396   27 380 399    ■ SCHZEROS  21,3342 533    1 526
 RTSTDEX   E7,1431  25    6 256 271     ■ S+ZERO        7665 377   15 378 401 = ■ SCNBAZ    17,3704 499    1 493
 RTSTLOC   E7,1434  25    4  25 269     ■ SAC       E5,1474  22    -   -   -    ■ SCNBVER   17,3716 499    2 493
 RTSTMAX   E7,1432  25    3 256 270     ■ SAMODCHK  16,2556 501    1 267        ■ SCOMP     15,3100 417    2 417
 RTSTNV    11,2471 270    1 269         ■ SAMODRTN  16,3235 511    1 461        ■ SCOUNT       1366  18    4 378 401 =
 RUN       E5,1550  23   16 454 512     ■ SAMPLIM       0414  16    7 158 249   ■ SCOUTEND  04,2645 316    4 316 317
 RUPTAGN       1070  17   6  17 255     ■ SAMPLSUM      0415  16    7  16 376   ■ SDISPLAY  20,3471 396    2 396
 RUPTCHK   20,2716 388    1 388         ■ SAMPSUM       0415  16    -   -   -  = ■ SDSPTAB   01,3045 402    1 402
 RUPTCON   20,2747 388    1 389         ■ SAMPTIME      0013   7    3 353 357 = ■ SELECTX   16,2537 500    1 500

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                                       ■                                        ■
 SELECTY    16,2543 500    1 500       ■  SFOUTABR   05,2525 315    1 314       ■  S-7        20,2014 377    2 378 386
 SELECTZ    16,2547 500    1 500       ■  SFRET1     05,2733 321   -   -   -    ■  S-MAX      20,3432 396    8 387 400
 SELFADRS   20,2017 378    2 396 397   ■  SFRET      05,2751 322   -   -   -    ■  S-ZERO        7666 377    2 385 394 =
 SELFBANK      4503 137    1 137       ■  SFRUTMIX   05,2721 321    4 307 324   ■  SKEEP1        1371  18   61 377 401 =
 SELFCHK    20,2101 379    5 137 401   ■  SFRUTNOR   05,2713 321    4 313 324   ■  SKEEp2        1372  18   36 381 403 =
 SELFERAS      1360  18   -   -   -    ■  SFTEMP1       0107  10   16 312 348 = ■  SKEEP3        1373  18   27 383 403 =
 SELFRET       1360  18    6 137 396 = ■  SFTEMP2       0110  10    2 326     = ■  SKEEP4        1374  18   23 383 400 =
 SELPOSN    17,3400 493   -   -   -    ■  SGNAGREE   15,3406 426    6 283 506   ■  SKEEP5        1375  18   15 384 395 =
 SENDIT     11,2546 272    2 272       ■  SGNCOM     04,2302 298    1 298       ■  SKEEp6        1376  18   24 381 400 =
 SENDPULS   13,2222 195    1 193       ■  SGNOFF        0107  10    3 298     = ■  SKEEP7        1377  18   30 380 400 =
 SETADR     12,2442 159    1 151       ■  SGNON         0106  10    3 298     = ■  SKIPPAXS   23,2147 544    1 556
 SETAUG     04,2607 316    1 315       ■  SGNTAB     04,2323 298    2 298       ■  SKIPQRAD   24,2626 571    1 571
 SETEBANK      5171 355    2 307 317   ■  SGNTO1     04,2762 325    1 325       ■  SKIPQRAX   24,2073 563    1 571
 SETGLOCK   12,3156 172    4 172       ■  SGNTST1    04,2336 299    3 299       ■  SLAP1      12,2000 151    2 306 471
 SETIDLE    23,3115 556    1 159       ■  SGOT       15,3105 417    1 417       ■  SLEEPIE    21,2666 525    6 514 526
 SETISSW    12,3344 176    6 170 197   ■  SHAFTA     E5,1566  23   -   -   -    ■  SLEFT5        5216 356    1 333
 SETLOC     01,2276 129    3 129 133   ■  SHOLTS     05,3462 364    1 363       ■  SLOAD2        6470  50    4  50 426
 SETMULTF      5456 367    1 367       ■  SHORTMP       7266  66    4 296 331   ■  SLOAD         6505  50    1  42
 SETNADD       5167 355    2 304 323   ■  SHORTT     00,2000  78    2  41       ■  SLOPEHI    00,2274  86    1 109
 SETNCADR      5161 355    6 304 355   ■  SHORTV     00,2102  81    1  41       ■  SLOPELO    00,2740 100    1 110
 SETOVF2       7132  62    1  58       ■  SHOTIME       5412 361    1 361       ■  SMALL2     00,3006 101    1 103
 SETOVF        7061  60    1  88       ■  SHOW1      17,3600 497    1 497       ■  SMALL      00,3057 103    1 101
 SETPD         7541  73    1  42       ■  SHOW       17,3576 497    6 475 492   ■  SMDCALC    14,2263 449    2 445 461
 SETROUND   00,2252  85    3  85       ■  SHOWLD     17,3567 496    2 475 497   ■  SMD/EREF   15,3000 415    1 457
 SETRRCTR   10,2224 235    1 235       ■  SHOWSUM    20,3454 396    1 268       ■  SMNB1      15,2476 407   -   -   -
 SETRRECR   10,2106 232    2 232 238   ■  SHOWVB     13,3347 225    2 225       ■  SMNB       15,2473 407    5 237 416
 SETTIME4   12,2546 163    2 162 163   ■  SIGN          7603  75    1  42       ■  SMODE         1361  18    8 151 401 =
 SETTRKF       5042 229    4 179 253   ■  SIGNFIX    04,2744 325    2 324       ■  SMODECHK   20,2047 378    9 378 401
 SETUPER1   21,2631 523    1 521       ■  SIGNRET       0111  11   -   -   -  = ■  SMPAC+     00,3333 109    3 108
 SETUPER    21,2753 526    2 514 524   ■  SIGNTEST   04,2326 299    2 298       ■  SN1        00,3501 112    1 111
 SETUPMSG   11,2634 274    1 258       ■  SILVER     16,2520 500    1 483       ■  SOMEERRR   21,2716 525    1 521
 SETVAC     05,3336 336    1 336       ■  SIN22.5    24,3335 581    1 581       ■  SOMEKEY    13,3233 222    1 222
 SEVEN         7663  76   13  77 594   ■  SINBLANK   04,2532 302    1 302       ■  SOMERR2    21,2721 525    1 523
 SF1           0076 538    6 619 621 = ■  SINE       00,3456 111    1  44       ■  SOMETIME   14,3502 468    1 468
 SF2           0077 538    5 619 621 = ■  SINTH         0022  22   12 404 470 = ■  SOpTION1   20,2071 379    1 379
 SFAIL         1364  18    5 154 378 = ■  SISZ       15,3070 417    1 417       ■  SOPTION2   20,2072 379   -   -   -
 SFCOM      16,2043 348    1 348       ■  SIX           6162  76   18  67 583 = ■  SOPTION3   20,2073 379   -   -   -
 SFCONST1   E5,1623  23    2 483 485 = ■  SIZCHK     17,3654 498    2 485       ■  SOPTION4   20,2074 379   -   -   -
 SFCONST    17,3653 498    1 482       ■  SIZLOOK    17,2462 482    1 482       ■  SOpTION5   20,2075 379   -   -   -
 SFCONUM    05,2734 322    2 314 323   ■  S-1           7667 377    8 381 398 = ■  SOPTION6   20,2076 379   -   -   -
 SFINTAB    16,2252 351    1 348       ■  S-2           7670 377    3 383 399 = ■  SOPTION7   20,2077 379   -   -   -
 SFINTABR   05,3067 324    1 324       ■  S-3           7671 377    1 383     = ■  SOPTION    20,3434 396    1 395
 SFOUTAB    16,2330 352    1 348       ■  S-4           6045 377   -   -   -  = ■  SOpTIONS   20,2060 378    2 378

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                                       ■                                        ■
 SOPTON10   20,2100 379   -   -   -    ■  STDESIG    10,2431 241    2 233 241   ■  T3RUPT     01,2736 146    2  27  28
 SOPTON11   01,3012 401   1 401        ■  STEERADR   E6,1553 539    3 604 610   ■  T4JUMP     12,2547 164   -   -   -
 SOUPLY     21,3354 533   -   -   -    ■  STEPDLYT   E4,1525  21    1 438     = ■  T4LINIT    12,2411 158    1 158
 SOUTHDR    E5,1552  23   5 476 483    ■  STEPEXIT   E4,1604  20   -   -   -  = ■  T4LOC         0347  15    5 158 163
 SPCOS         4232 123   3 181 430    ■  STILLOOK   17,2620 484    1 484       ■  T4RPTBB       4023  27    1 160
 SPDPMULT   26,3302 624   2 623        ■  STILLRCS   24,3122 578    6 577 618   ■  T4RUPT        4713 160    1  27
 SPECSTS    21,2077 515   1 527        ■  STODLCDU   24,3020 576    1 576       ■  T4RUPTA    12,2451 162    2  27 160
 SPECTEST   01,2266 129   1 133        ■  STOPTEST   17,2760 486    2 484 485   ■  T5ADR         0345  14   17 151 617 =
 SPROOT1       4340 124   2 124        ■  STORCDUY   E6,1547 539    4 605 610   ■  T5LOC         0345  14    2  14  27
 SPROOT2       4351 125   1 124        ■  STORCDUZ   E6,1550 539    3 608 610   ■  T6ADR         0343  14   -   -   -  =
 SPROOT3       4311 124   1 125        ■  STORE1        6627  52    4  83 119   ■  T6JOB         4203  33    1 553
 SPROOT        4275 124   3 590 624    ■  STORE         6422  47    6  46       ■  T6JOBCHK      4177  33   11  33 623
 SPSIN         4233 123   2 181        ■  STOREDTA   21,3047 529    2 516 529   ■  T6LOC         0343  14    1  14
 SPT           4236 123   1 123        ■  STOREPL    E5,1551  23   13 445 508   ■  T6NEXT        0766  16   19  33 558
 SQ            1106  17   2 123      = ■  STORE,1       6414  47    5  46       ■  T6NEXTJT      0770  16   17  33 555
 SQRARG        1107  17   5 124 125    ■  STORE,2       6417  47    5  46       ■  T6NXT=+    23,3023 554    1 553
 SQRESCAL   26,3244 623   1 623        ■  STORJUMP      6352  46    1  45       ■  T6OFFNOW   23,2724 553    1 553
 SQRT       00,3135 105   1  44        ■  STORRSLT   14,2454 454    3 445 446   ■  T6ONNOW    23,2742 553    2 553
 SQRTABRT   00,3331 108   2 108        ■  STRTGYR2   13,2406 200    4 201 204   ■  T6RPTBB       4055  28   -   -   -
 SQRTNEG    00,3322 108   1 108        ■  STRTGYRO   13,2402 200    2 198 203   ■  T6ZERO        4230  33    1  33
 SQRTNM2    00,3423 110   1 110        ■  STRTWACH   17,2570 483   -   -   -    ■  TABLNTH    12,2520 163    1 163
 SQRTNORM   00,3430 110   1 110        ■  STSHOSUM   20,3304 394    1 396       ■  TAD           7050  60    1  42
 SQRTSHFT   00,3147 105   1 105        ■  SUBTR      00,3630 114    1  85       ■  TAGSUB     01,2061 117   10 116 117
 SQRTSUB    00,3272 108   3 101 113    ■  SUMRATEQ   E6,1640 540    6 187 633   ■  TANG          0423  16   24  16 503
 SR            0021   7  44  78 393  = ■  SUMRATER   E6,1641 540    5 187 633 = ■  TAR1       14,2356 451    1 452
 SRADRS     20,2016 378   1 380        ■  SVCT3         4571 140    1 140       ■  TAR/EREF   14,2350 451    3 448 462
 SRDDV      00,2005  78   1 101        ■  SWBIT         0115  11    5 120 122 = ■  TASKOVER      4602 147   73 139 639
 SRGHT5     07,2465 287   2 286        ■  SWBRANCH      6703  55    1 122       ■  TAU        E4,1560  20   -   -   -  =
 SRTEST     00,3404 110   1 109        ■  SWCALL        4067  29    4 150 466   ■  TAVEGON    E4,1510  20   -   -   -  =
 SSP           6624  52   1  42        ■  SWINIT     12,2444 159    2 152       ■  TAZEL1     E5,1553  23    4 451 454
 STADR         6334  45   1  44        ■  SWITCHES   01,2135 120    1 122       ■  TC         E4,1444  19   -   -   -  =
 STALL      13,2717 207   2 207        ■  SWRETURN      4076  29   13 190 528   ■  TC+TCF     20,2102 379    1 379
 STAR       E5,1466  22   -   -   -    ■  SW7        01,2135 122    1  43     = ■  TCFINDVC      5232 356    1 336
 STARAD     E5,1444  22  39 413 493    ■  SWSGN      04,3367 338    1 338       ■  TCNOVAC       5227 356    1 336
 STARM         0040  22   -   -   -  = ■  SWSKIP     01,2216 122    2 122       ■  TCQ           4712 150    2 150 229
 STARTDAP   23,3175 557   1 557        ■  SWSTORE    01,2172 121    2 121       ■  TCQBNK00   00,3403 109    1 109
 STARTDES   10,2331 238   1 240        ■  SWTAB      04,3416 339    4 338 343   ■  TCSUBTR    00,2247  85    1 113
 STARTEB    12,2414 159   1 156        ■  SWWORD        0114  11    2 120 121 = ■  TCTSKOVR      5231 356   -   -   -
 STARTSIM   12,2065 152   -   -   -    ■  SXA        01,2020 116    1  43       ■  TCWAIT        5230 356    1 337
 STARTSTO      6431  48   1  47        ■  SYSTEST    11,2327 267    1 258       ■  TDEC       E4,1566  20    2 348 353 =
 STARTSUB   12,2214 156   2 151 153    ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  TDELTAV    E4,1414  19   -   -   -  =
 STARTSW    12,2064 152   -   -   -    ■  T3RPTBB       4056  28    1  27       ■  TEM1          0125  11    4  11 101
 STATE         0061   9  26 120 510    ■  T3RUPT2    01,2741 146    1 147       ■  TEM2          0126  11    8  11 430

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SYMBOL H  DEFINITION   REFERENCES F ■ SYMBOL H  DEFINITION   REFERENCES F ■ SYMBOL H  DEFINITION   REFERENCES F
                                    ■                                     ■
TEM3         0127  11   1  11       ■ THREE        6165  76  27  77 632 = ■ TOFJTCHG  E6,1505 537  23 545 572
TEM4         0130  11   3  11       ■ THROTADD  14,3347 466   1 468       ■ TOJTLST   24,2674 572   3 572
TEM5         0131  11   1  11       ■ THROTASK  14,3460 468   2 467 468   ■ TORK      16,2530 500   1 500
TEMK         1105  17  10 123     = ■ THROTON1  06,2467 442   1 441       ■ TORKSETP  25,2326 595   1 595
TEMP      E5,1575  23   8 466 469 = ■ THROTON   06,2505 442   2 441 442   ■ TORKTABL  25,2355 596   2 595
TEMPADD   E5,1574  23   5 468 469 = ■ THRSBITS  14,3645 472   -   -   -   ■ TORKX     16,2553 500   1 500
TEMPOK    12,3216 173   2 173       ■ THRSTART  06,2435 441   1 432       ■ TORKY     16,2554 500   1 500
TEMPTIME  E5,1561  23   2 453       ■ THRSTCMD  E6,1533 538   1 559     = ■ TORKZ     16,2555 500   1 500
TEN          7661  76   9  67 480   ■ THRTSTEP  E4,1605  21  13 441 442 = ■ TORQGYRS  11,2266 265   1 258
TENMS     20,2724 388   1 388       ■ THRUST       0055   8   3 442 468 = ■ TORQGYRV  11,2302 265   1 265
TERMA     E6,1521 537  13 579 591   ■ TIMAR     E3,1506  19   9 281 283   ■ TORQINCH  21,2645 523   1 523
TERMB     E6,1522 537   8 579 591   ■ TIME1        0025   7  10  28 525 = ■ TORQNDX   E5,1574  24   6 475 525 =
TERMCADR     4661 149   1 149       ■ TIME2        0024   7  12 222 425 = ■ TORQUE    17,2075 476   1 524
TERMEXTV  11,2055 259   8 261 273   ■ TIME3        0026   7   5 141 471 = ■ TORQUEV   24,2554 571   3 566 587
TEST      01,2204 122   1 122       ■ TIME4        0027   7   5 156 388 = ■ TOSMODE   01,3015 401   2 401 402
TESTCADR  11,2356 267   1 267       ■ TIME5        0030   7  11 156 615 = ■ TP        E6,1625 540  10 540 552
TESTCALL  17,2451 482   4 482 486   ■ TIME6        0031   7  10  33 557 = ■ TPAGREE      7235  66   5 198 426
TESTNN    05,2037 304   1 330       ■ TIMEDIFF  E3,1510  19   2 283       ■ TPDVL        6614  52   1  52
TESTNO    E5,1563  23  15 482 504   ■ TIMEHOLD     0421  16   5 247 376   ■ TPLEFT7   04,3054 326   2 317 326
TESTNV    11,2375 267   1 267       ■ TIMEOFFQ  E6,1545 538   1 557       ■ TPSIG     E6,1440 536   8 546 592
TESTOFUF  04,3075 327   4 324 331   ■ TIMEOFFR  E6,1546 538   1 557       ■ TPSIGCHG  24,3573 586   2 585
TESTSIGN  23,2500 550   1 549       ■ TIMER     E5,1624  23   2 484     = ■ TPSL1        5263 357   4 324 326
TESTTIME  17,3660 498   1 475       ■ TIMESAV   E3,1502  19   5 281 283   ■ TPUSH     00,3222 106   1 106
TESTVB    05,2033 303   -   -   -   ■ TIMEWACH  17,2627 484   1 484       ■ TQORESTM  21,2725 526   1 524
TESTXACT  11,2040 258   8 260 273   ■ TIX       01,2047 117   1  43       ■ TQR       E6,1626 540  10 558 587 =
TET       E4,1446  19   1 348     = ■ T-JETLAW  23,2663 552   2 552 589   ■ TQRGTTM1  24,2567 571   1 571
TGENTRY   26,2747 618   1 618       ■ TJETADR   E6,1514 537   4 565 596   ■ TR1       06,2417 439   1 439
TGOFFCAL  26,3442 628   2 618       ■ TJET-LAW  24,3644 587   2 574 587   ■ TRACE1    04,3132 331   -   -   -
TGOFFNOW  26,3511 629   2 628 629   ■ TJETLAW   25,2000 588   1 556       ■ TRACE1S   04,3143 331   -   -   -
THBUF     E4,1405  21   2 442     = ■ TJETSCAL  25,2164 590   1 588       ■ TRANSM1   E5,1720  24   4 476 518 =
THCOMM1   E4,1630  21   1 442     = ■ TJMIN     25,2044 589   1 588       ■ TRANSPSE  15,2766 415   2 457
THCOMM2   E4,1636  21   1 441     = ■ TJSR      E6,1460 536   -   -   -   ■ TRESUME   E4,1512  20   -   -   - =
THETA        0024  22   7 406 472 = ■ TJSUM     25,2163 590   1 591       ■ TRIG1     15,2453 406   1 406
THETAADR  14,3675 472   1 470       ■ TLIM      12,3205 173   1 168       ■ TRIG2     15,2464 406   1 406
THETAD       0400  16  30 192 511   ■ TLOAD        6474  50   1  42       ■ TRIMCODE  06,2425 440   1 439     =
THETADLD  16,3102 508  10 501 502   ■ TMALM        4606 287   1 286     = ■ TRIMIND   E4,1571  21   1 439     =
THETAN    E5,1624  24  12 521 526 = ■ TMARK     E5,1564  23   5 447 461   ■ TRIMMASK  06,2426 440   2 438 439
THETAX    E5,1616  24   4 522 526 = ■ TMEXITL   15,2151 372   1 371       ■ TRIMOFF   06,2327 438   1 439
THIRTEEN  00,3075 103   1 101       ■ TMFAIL1   07,2457 286   -   -   -   ■ TRIMOFFT  E4,1555  21   1 439     =
THLD1     16,3110 508   1 508       ■ TMFAIL2   07,2452 286   2 287       ■ TRIMON1   06,2363 439   2 439 440
THR1COMM  06,2475 442   1 442       ■ TMINDEX   E7,1402  25  10 371 373   ■ TRIMON    06,2350 439   2 439
THR1TIME  E4,1622  21   1 442     = ■ TNONTEST  12,2755 168   1 168       ■ TRIMONT   E4,1541  21   1 438     =
THR2COMM  06,2447 441   1 442       ■ TNUV      E4,1422  19   -   -   - = ■ TRIMSET   06,2342 438   1 438

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  SYMBOL H   DEFINITION    REFERENCES F ■  SYMBOL H   DEFINITION    REFERENCES F ■  SYMBOL H   DEFINITION    REFERENCES F
                                        ■                                       ■
  TRIMSTEP   E4,1510  21   12 438 439 = ■  UPDATNN    05,2275 308    2 341        ■  V21N30K    06,2056 432    1 431
  TRIMTOP    06,2315 438    1 432       ■  UPDATRET      0103  10    3 308 309 =  ■  V21N43E    13,3427 226    1 219
  TRKFLCDJ   12,3520 179   -   -   -    ■  UPDATVB    05,2315 309    8 301 341    ■  V24N30E    14,3655 472    1 444
  TRKFLON       5061 229    2 229       ■  UPLOCK        0342  13    9 151 376    ■  V24N42E    13,3430 226    1 220
  TRKOFF     10,2625 245    2 245       ■  UPM        23,3112 556    2 552        ■  V25N22E    14,3656 472    1 457
  TRSLTMN2   24,2645 572   -   -   -    ■  UPOK       07,2431 286   -   -   -     ■  V33N00X    16,3354 513    1 510
  TRUNA      E5,1567  23   -   -   -    ■  UPRPT1     07,2414 286   -   -   -     ■  V43K       11,2632 273    1 273
  TRYCOUNT   10,2715 248   -   -   -    ■  UPRPTBB       4057  28    1  27     =  ■  V47K       06,2060 432    1 431
  TRYSWN     10,2402 240    1 240       ■  UPRUPT     07,2402 286    1  27        ■  V50K       06,2430 440    1 439
  TRYSWS     10,2351 239    1 237       ■  UP/DOWN    12,3637 186   -   -   -     ■  VAC1          0432  16   -   -   -
  TSELECT    11,2351 267    2 267 478   ■  UPTEST     07,2474 287    2 286        ■  VAC1ADRC   12,2412 159    1 157
  TSKADRS    20,2762 389    1 388       ■  UPTMFAST   12,3337 175    1 177        ■  VAC1USE       0431  16    4 128 218
  TSLC2      00,2153  83    1  73       ■  UQM        24,3524 584    2 580 583 =  ■  VAC2          0506  16   -   -   -
  TSLC          7544  73    1  42       ■  URGENCYQ   E6,1515 537    8 578 583    ■  VAC2USE       0505  16    3 128 218
  TSLCLOOP   00,2161  83    1  83       ■  URGENCYR   E6,1516 537   11 578 582    ■  VAC3          0562  16   -   -   -
  TSLCTEST   00,2167  83    1  83       ■  URGMULT    24,3626 586    1 586        ■  VAC3USE       0561  16    3 128 218
  TSSL       00,2062  80    3  78  87   ■  URGROUTN   24,3525 585    3 552 578    ■  VAC4          0636  16   -   -   -
  TSSR       00,2006  78   -   -   -    ■  URGSTORE   24,3642 586    3 586        ■  VAC4USE       0635  16    3 128 218
  TSTAB      04,2377 300    1 300       ■  URGTOA     24,3641 586    1 586        ■  VAC5          0712  16   -   -   -
  TSTCON1    05,3457 363    1 363       ■  URM        24,3524 584    2 579 582 =  ■  VAC5USE       0711  16    3 128 218
  TSTCON2    05,3460 364    1 363       ■  USEPRET       4131  31   -   -   -     ■  VACFOUND   01,2235 128    5 128
  TSTCON3    05,3461 364    1 364       ■  USPRCADR      4141  31   -   -   -     ■  VACSTOR    13,3264 223    1 223
  TSTFORDP   05,2420 313    1 312       ■  UVXFORM    24,3476 584    1 584        ■  VAD           6733  57    1  42
  TSTLTS1    05,3432 363    1 363       ■  UXFORM     24,3474 584    4 580 582    ■  VALMIS     17,2223 478    1 524
  TSTLTS2    05,3463 364    1 363       ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  VARADAR    10,3326 257    1 256
  TSTLTS3    05,3470 364    1 364       ■  V01N10X    16,3347 513    1 509        ■  VARDELAY      4557 139    4 169 192
  TSTMPAC6   12,2174 154   -   -   -    ■  V01N25K    06,2427 440    1 439        ■  VAVEGON    E4,1522  20   -   -   -  =
  TSTORE        6451  48    1  48       ■  V01N30D    14,3647 472   -   -   -     ■  VB06N66    17,3657 498    2 486 497
  TSTUPLOK   07,2444 286    2 286       ■  V01N30E    14,3651 472    2 447        ■  VB21N30E   13,3432 226    1 225
  TWO           7656  76   89  28 633 = ■  V04N01K    06,2057 432    1 431        ■  VB50       13,3433 226    1 225
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■  ■  V04N30D    14,3643 472    1 467        ■  VB51       13,3355 225    1 219
  U          E6,1455 536   -   -   -    ■  V05N30E    14,3652 472    1 454        ■  VB53       13,3431 226    1 219
  UMANDACC   E6,1667 541    3 580 634 = ■  V05N30X    16,3350 513    1 512        ■  VBCOARK    11,2073 259    1 258
  UMPAC+     00,3116 104    2 104       ■  V06N03E    14,3653 472    1 470        ■  VBFANDIR   05,2133 305    1 305
  UMPAC-     00,3110 104    2 104       ■  V06N20X    16,3351 513    2 510 511    ■  VBPROC     04,3310 337    2 306 337
  UNAJUMP       6315  44    1  41       ■  V06N40X    16,3352 513    1 510        ■  VBRELDSP   04,3320 337    1 294
  UNIT       00,2750 101    1  44       ■  V06N66E    14,3654 472    1 465        ■  VBRQEXEC   05,3314 336    1 305
  UNITDV     00,3077 104    3 102       ■  V06N66X    16,3353 513    1 507        ■  VBRQWAIT   05,3340 337    1 305
  UNITR         1016  17   -   -   -    ■  V16N20S    17,3661 498    1 479        ■  VBSP1LD    05,2673 321    2 319
  UNITW         1024  17   -   -   -    ■  V16N40S    17,3662 498    1 481        ■  VBSP2LD    05,2674 321    2 319
  UNZ2       12,3037 170    1 170       ■  V1ST02S    15,3414 426    1 412        ■  VBSP3LD    05,2675 321    1 319
  UPDAT1     05,2322 309    1 309       ■  V21N02K    06,2055 432    1 431        ■  VBTERM     04,3315 337    2 306 364
  UPDATIME   11,2312 266   -   -   -    ■  V21N30E    17,3651 498    1 482        ■  VBTSTLTS   05,3414 363    1 306

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 SYMBOL H  DEFINITION   REFERENCES F ■ SYMBOL H  DEFINITION   REFERENCES F ■ SYMBOL H  DEFINITION   REFERENCES F
                                     ■                                     ■
 VBUF         0106  10  58  10 216   ■ VSQSUB    00,3246 107   3 101 106   ■ WEDOQ     25,2065 589   1 589
 VBZERO    11,2070 259   1 258       ■ VSSL      00,2126  82   3  81  87   ■ WEDOR     25,2063 589   1 589
 VCV       E4,1436  19   -   -   - = ■ VSSR      00,2110  81   1  85       ■ WFORP     E6,1655 540   5 540 560
 VD1          5237 356   6 158 333   ■ VSTORE       6440  48   -   -   -   ■ WFORQR    E6,1656 540   8 559 633 =
 VDEF      00,3160 106   1  44       ■ VSU          6761  58   1  42       ■ WHIMPER      5455 367   2 367
 VECMODE   15,3404 426   1 428       ■ VV/SC        7555  74   -   -   -   ■ WKSEARCH     5367 361   2 361 362
 VECTAB    E4,1510  20   -   -   - = ■ VVXSC        7357  69   -   -   -   ■ WLARGE    26,3071 620   2 620
 VELCHK    10,2747 248   1 248       ■ VXFORM    24,3466 584   4 581 582   ■ WMATFLAG     0000   9   -   -   - =
 VELSC     21,3365 533   1 517       ■ VXM          7312  67   1  42       ■ WORCHK    20,3007 389   -   -   -
 VERB      04,2235 297   1 294       ■ VXM/MXV      7315  68   1  67       ■ WPLATI    E5,1714  24   2 519 520 =
 VERBFAN   05,2116 305   7 304 307   ■ VXSC         7354  69   1  42       ■ WPLATO    E5,1620  24   3 519 520 =
 VERBREG      0266  13  18 157 330   ■ VXV          7434  71   1  42       ■ WPOINTER  E6,1556 539   5 605 610
 VERBTAB   05,2136 305   1 305       ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ WRCHN12   26,3400 625   3 618 625
 VERTDRFT  17,2167 477   -   -   -   ■ W0        E6,1557 539   4 539 608   ■ WRDRET       0101  10   -   -   - =
 VIGNTION  E4,1406  19   -   -   - = ■ W1        E6,1560 539   3 539 608 = ■ WRITECHK  20,2770 389   -   -   -
 VISFZADR  23,3361 560   2 544 558   ■ W2        E6,1561 539   3 605 609 = ■ WRITEJTS     4220  33   8  33 551
 VLAUN     E5,1644  24   9  24 518 = ■ W         E4,1630  20   -   -   -   ■ WRITEON   24,2514 570   6 570 571
 VLAUNS    E5,1616  24   3  24 517 = ■ WAIT2     01,2566 141   2 139       ■ WRITEQR      4225  33   4  33 572
 VLOAD        6511  50   1  42       ■ WAIT      20,2744 388   1 388       ■ WSFTEST   26,3023 619   1 620
 VLOADCOD     7641  77   1  49     = ■ WAITADR      0070   9   3 139 142 = ■ WTABORT   01,2715 144   1 142
 VLOAD*       6042  77   1  49     = ■ WAITBANK     0066   9   2 139 141 = ■ WTGTSMPL  21,2707 525   1 525
 VMANDACC  E6,1670 541   3 581 634 = ■ WAITBB       4553 139   2 139 147   ■ WTLISTNT  21,2676 525   2 525 527
 VMESSAGE  11,2745 276   1 275       ■ WAITER    14,3650 472   3 467 469   ■ WTLPCADR  17,3232 491   2 491
 VN1          1062  17   -   -   -   ■ WAITEXIT     0065   9   3 139     = ■ WTLST2    01,2723 145   8 143 144
 VN           1006  17   -   -   -   ■ WAITFIVE  17,2542 483   1 483       ■ WTLST4    01,2612 142   1 145
 VNCON     20,3436 396   1 396       ■ WAITLIST     4536 139  86 151 639   ■ WTLST5    01,2642 143   1 141
 VNLDRCDU  11,2255 264   1 264       ■ WAITLOOP  17,3205 491   4 476 483   ■ WVECTOR   26,2403 612   2 605
 VNLODCDU  11,2152 261   2 261 273   ■ WAITLP1   17,3210 491   2 491       ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
 VNLODDT   11,2326 266   1 266       ■ WAITLP2   17,3227 491   4 477 483   ■ X1           0046   8  10  38 518 =
 VNLODGYR  11,2232 263   2 263 265   ■ WAITLP3   17,3233 491   1 491       ■ X2           0047   8   1  47     =
 VPDVL        6577  52   -   -   -   ■ WAITTEMP     0071   9   3 145     = ■ XACTO     11,2060 259   2 259 264
 VPROJ        7400  70   1  42       ■ WAKETEST  01,2435 133   1 133       ■ XACTOQ    11,2065 259   2 259
 VRECT     E4,1406  19   -   -   - = ■ WANDCHK   20,3023 389   -   -   -   ■ XACT1     11,2044 258   -   -   -
 VRIGHT2   00,2222  85   1  85       ■ WANGI     E5,1572  23   5 476 520 = ■ XACTALM   11,2053 259   2 258 267
 VROTATEX     7373  69   3  81 102   ■ WANGO     E5,1570  23   4 476 520 = ■ XAD2      01,2035 117   2 117
 VROUND       7120  62   6  69  70   ■ WANGT     E5,1574  23   2  24 519 = ■ XAD       01,2032 117   1  43
 V/SC1        7560  74   1  74       ■ WARESCAL  26,3060 620   1 620       ■ XAXOVRD   11,3343 369   1 368
 V/SC2     00,2576  97   1  74       ■ WCENTRAL     0070 538   5 619 621 = ■ XCHX      01,2024 116   1  43
 V/SC         7552  74   1  42       ■ WCHANGER  23,3362 560   -   -   -   ■ XDC       E5,1422  22  17  22 523
 V/SCDV    00,2675  99   3  98       ■ WDAGAIN   05,3230 332   2 333       ■ XJBUF     E4,1401  21   4 434     =
 VSHR2     00,2041  79   1  79       ■ WDCNT        0123  11   5 331 333 = ■ XJETMASK  06,2204 435   1 434
 VSHRRND   00,2054  79   4  81 115   ■ WDRET        0101  10   6 331 333 = ■ XJETS     E4,1440  21   1 434     =
 VSQ       00,3174 106   1  44       ■ WEDOP     25,2061 589   1 589       ■ XKEP      E4,1450  19   -   -   - =

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  SYMBOL H  DEFINITION    REFERENCES F ■   SYMBOL H  DEFINITION    REFERENCES F ■   SYMBOL H  DEFINITION    REFERENCES F
                                       ■                                        ■
  XMKRUPT   13,3245 223    1 222       ■   YSM       E5,1406  22   31 411 497 = ■   ZEROMAIN  16,3160 509    2 501 511
  XNB       E5,1422  22    6 411 460 = ■   YUNIT     15,3035 416    2 415 460   ■   ZEROMODE  16,3150 509    4 501 512
  XREG         0270  13    3 314 322   ■   YV        E4,1613  20  -    -    - = ■   ZERONDX   E5,1776  23    6 451 514 =
  XREGLP       0273  13    3 296 322   ■   YZJBUF    E4,1402  21    4 434     = ■   ZEROURG   24,3623 586    2 586
  XSHIFT       1015  17  -    -    -   ■   YZJETMSK  06,2174 435    1 434       ■   ZERR      23,2017 542    3 542 543
  XSM       E5,1400  22   51  22 530   ■   YZJETS    E4,1450  21    1 434     = ■   ZNB       E5,1436  22    4 411 460 =
  XSMADR    17,3703 498    1 493       ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■   ZPRIME       0026  22    7 404 405 =
  XSMADRX   14,3676 472    1 451       ■   Z3DOT     E6,1600 539    3 611 625   ■   ZREG         0272  13    1 304
  XSTORE    01,2002 116    3 116       ■   Z            0005   7   13 304 348 = ■   ZREGLP       0275  13  -    -    -
  XSU       01,2043 117    1  43       ■   ZDATA2    12,2600 165    1 167       ■   ZRUPT        0015   7    4 388 389 =
  XTRANS    24,2504 570    9 565 587   ■   ZDC       E5,1436  22    4 405 490 = ■   ZSM       E5,1414  22   27 411 497 =
  XUNIT     15,3037 416    2 415 460   ■   ZERO         7665  76  240  27 636   ■   ZUNIT     15,3033 416    2 415 460
  XYMARK       0375  15    8 218 349   ■   ZEROANS   00,3325 108    2 108       ■   ZV        E4,1621  20  -    -    - =
■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ ■   ZEROCOEF  25,3275 633    1 630       ■ ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
  Y3DOT     E6,1576 539    5 606 625   ■   ZERODATA  12,2712 167    1 165       ■   (1-K)QR   E6,1657 540    6 540 633
  YCOM      E6,1437 536    2 369       ■   ZERODP    15,3041 416    8 404 493   ■   (1-K)/8   E6,1660 540    2 564 630 =
  YDC       E5,1430  22    6 405 490 = ■   ZEROERAS  14,3613 471    1 267       ■   (1-K)/8P  23,2166 545    1 545
  YISZ      15,3075 417    1 417       ■   ZEROICDU     4755 189    2 170 191   ■   (1-K)S    25,3414 634    1 633
  YMKRUPT   13,3251 223    1 222       ■   ZEROING1  17,3240 491    1 491       ■   (1-K),QR  24,2715 573  -    -    -
  YNB       E5,1430  22    2 411 460 = ■   ZEROING   17,3236 491    4 451 514   ■   (1-KQ)/8  24,2716 573  -    -    -
  YREG         0271  13  -    -    -   ■   ZEROLPI   14,3634 471    1 471       ■   (2/3)     26,3441 626  -    -    -
  YREGLP       0274  13  -    -    -   ■   ZEROLP    14,3620 471    2 471

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SUMMARY OF SYMBOL TABLE LISTING

            592  DEFINED BY EQUALS

           2788  NORMALLY DEFINED
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 TOTAL:    3380
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MEMORY TYPE & AVAILABILITY DISPLAY

    0000  TO     0057    SPECIAL OR NONEXISTENT MEMORY       06,2557  TO 06,3777    AVAILABLE FIXED MEMORY
                 0060    AVAILABLE ERASABLE MEMORY           07,2000  TO 07,2503    RESERVED FIXED MEMORY
    0061  TO     0375    RESERVED ERASABLE MEMORY            07,2504  TO 07,3777    AVAILABLE FIXED MEMORY
    0376  TO     0377    AVAILABLE ERASABLE MEMORY           10,2000  TO 10,3342    RESERVED FIXED MEMORY

    0400  TO     0776    RESERVED ERASABLE MEMORY            10,3343  TO 10,3777    AVAILABLE FIXED MEMORY
                 0777    AVAILABLE ERASABLE MEMORY           11,2000  TO 11,3362    RESERVED FIXED MEMORY
    1000  TO     1110    RESERVED ERASABLE MEMORY            11,3363  TO 11,3777    AVAILABLE FIXED MEMORY
    1111  TO     1357    AVAILABLE ERASABLE MEMORY           12,2000  TO 12,3770    RESERVED FIXED MEMORY

    1360  TO E3,1511     RESERVED ERASABLE MEMORY            12,3771  TO 12,3777    AVAILABLE FIXED MEMORY
 E3,1512  TO E3,1777     AVAILABLE ERASABLE MEMORY           13,2000  TO 13,3435    RESERVED FIXED MEMORY
 E4,1400  TO E4,1737     RESERVED ERASABLE MEMORY            13,3436  TO 13,3777    AVAILABLE FIXED MEMORY
 E4,1740  TO E4,1777     AVAILABLE ERASABLE MEMORY           14,2000  TO 14,3727    RESERVED FIXED MEMORY

 E5,1400  TO E5,1747     RESERVED ERASABLE MEMORY            14,3730  TO 14,3777    AVAILABLE FIXED MEMORY
 E5,1750  TO E5,1777     AVAILABLE ERASABLE MEMORY           15,2000  TO 15,3576    RESERVED FIXED MEMORY
 E6,1400  TO E6,1675     RESERVED ERASABLE MEMORY            15,3577  TO 15,3777    AVAILABLE FIXED MEMORY
 E6,1676  TO E6,1777     AVAILABLE ERASABLE MEMORY           16,2000  TO 16,3363    RESERVED FIXED MEMORY

 E7,1400  TO E7,1606     RESERVED ERASABLE MEMORY            16,3364  TO 16,3777    AVAILABLE FIXED MEMORY
 E7,1607  TO E7,1777     AVAILABLE ERASABLE MEMORY           17,2000  TO 17,3731    RESERVED FIXED MEMORY
    4000  TO     5513    RESERVED FIXED MEMORY               17,3732  TO 17,3777    AVAILABLE FIXED MEMORY
    5514  TO     5777    AVAILABLE FIXED MEMORY              20,2000  TO 20,3757    RESERVED FIXED MEMORY

    6000  TO     7702    RESERVED FIXED MEMORY               20,3760  TO 20,3777    AVAILABLE FIXED MEMORY
    7703  TO     7777    AVAILABLE FIXED MEMORY              21,2000  TO 21,3430    RESERVED FIXED MEMORY
 00,2000  TO 00,3660     RESERVED FIXED MEMORY               21,3431  TO 22,3777    AVAILABLE FIXED MEMORY
 00,3661  TO 00,3777     AVAILABLE FIXED MEMORY              23,2000  TO 23,3412    RESERVED FIXED MEMORY

 01,2000  TO 01,3146     RESERVED FIXED MEMORY               23,3413  TO 23,3777    AVAILABLE FIXED MEMORY
 01,3147  TO 01,3777     AVAILABLE FIXED MEMORY              24,2000  TO 24,3724    RESERVED FIXED MEMORY
 02,2000  TO 03,3777     SPECIAL OR NONEXISTENT MEMORY       24,3725  TO 24,3777    AVAILABLE FIXED MEMORY
 04,2000  TO 04,3541     RESERVED FIXED MEMORY               25,2000  TO 25,3664    RESERVED FIXED MEMORY

 04,3542  TO 04,3777     AVAILABLE FIXED MEMORY              25,3665  TO 25,3777    AVAILABLE FIXED MEMORY
 05,2000  TO 05,3525     RESERVED FIXED MEMORY               26,2000  TO 26,3522    RESERVED FIXED MEMORY
 05,3526  TO 05,3777     AVAILABLE FIXED MEMORY              26,3523  TO 43,3777    AVAILABLE FIXED MEMORY
 06,2000  TO 06,2556     RESERVED FIXED MEMORY               44,2000  TO 67,3777    SPECIAL OR NONEXISTENT MEMORY
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   4000 TO    4045   27        6000 TO    6012   34        7552 TO    7602   74     00,3536 TO 00,3577  113
   4046 TO    4062   28        6013 TO    6035   35        7603 TO    7635   75     00,3600 TO 00,3641  114
   4063 TO    4111   29        6036 TO    6047   36        7636 TO    7673   76     00,3642 TO 00,3656  115
   4112 TO    4130   30        6050 TO    6070   37        7674 TO    7700   77     00,3657 TO 00,3660  642

   4131 TO    4155   31        6071 TO    6134   38        7701 TO    7702  642     01,2000 TO 01,2031  116
   4156 TO    4174   32        6135 TO    6166   39     00,2000 TO 00,2020   78     01,2032 TO 01,2066  117
   4175 TO    4231   33        6167 TO    6216   40     00,2021 TO 00,2061   79     01,2067 TO 01,2106  118
   4232 TO    4274  123        6217 TO    6234   41     00,2062 TO 00,2101   80     01,2107 TO 01,2134  119

   4275 TO    4344  124        6235 TO    6274   42     00,2102 TO 00,2124   81     01,2135 TO 01,2151  120
   4345 TO    4362  125        6275 TO    6314   43     00,2125 TO 00,2152   82     01,2152 TO 01,2173  121
   4363 TO    4415  126        6315 TO    6333   44     00,2153 TO 00,2173   83     01,2174 TO 01,2217  122
   4416 TO    4447  127        6334 TO    6351   45     00,2174 TO 00,2215   84     01,2220 TO 01,2252  128

   4450 TO    4503  137        6352 TO    6413   46     00,2216 TO 00,2256   85     01,2253 TO 01,2316  129
   4504 TO    4535  138        6414 TO    6430   47     00,2257 TO 00,2311   86     01,2317 TO 01,2371  130
   4536 TO    4566  139        6431 TO    6454   48     00,2312 TO 00,2331   87     01,2372 TO 01,2374  131
   4567 TO    4601  140        6455 TO    6464   49     00,2332 TO 00,2401   88     01,2375 TO 01,2413  132

   4602 TO    4613  147        6465 TO    6526   50                00,2402   89     01,2414 TO 01,2462  133
   4614 TO    4641  148        6527 TO    6562   51     00,2403 TO 00,2443   90     01,2463 TO 01,2473  134
   4642 TO    4666  149        6563 TO    6630   52     00,2444 TO 00,2461   91     01,2474 TO 01,2533  135
   4667 TO    4712  150                   6631   53     00,2462 TO 00,2511   92     01,2534 TO 01,2565  136

   4713 TO    4754  160        6632 TO    6661   54     00,2512 TO 00,2531   93     01,2566 TO 01,2611  141
   4755 TO    4762  189        6662 TO    6710   55     00,2532 TO 00,2546   94     01,2612 TO 01,2641  142
   4763 TO    4776  227        6711 TO    6732   56     00,2547 TO 00,2563   95     01,2642 TO 01,2705  143
   4777 TO    5041  228        6733 TO    6760   57     00,2564 TO 00,2575   96     01,2706 TO 01,2722  144

   5042 TO    5077  229        6761 TO    7010   58     00,2576 TO 00,2636   97     01,2723 TO 01,2735  145
   5100 TO    5106  330        7011 TO    7047   59     00,2637 TO 00,2674   98     01,2736 TO 01,2772  146
   5107 TO    5122  340        7050 TO    7062   60     00,2675 TO 00,2724   99     01,2773 TO 01,2777  367
   5123 TO    5130  341        7063 TO    7115   61     00,2725 TO 00,2747  100     01,3000 TO 01,3042  401

   5131 TO    5151  342        7116 TO    7133   62     00,2750 TO 00,3017  101     01,3043 TO 01,3120  402
   5152 TO    5160  343        7134 TO    7174   63     00,3020 TO 00,3056  102     01,3121 TO 01,3144  403
   5161 TO    5210  355        7175 TO    7216   64     00,3057 TO 00,3076  103     01,3145 TO 01,3146  642
   5211 TO    5250  356        7217 TO    7234   65     00,3077 TO 00,3121  104     04,2000 TO 04,2050  294

   5251 TO    5303  357        7235 TO    7303   66     00,3122 TO 00,3157  105     04,2051 TO 04,2117  295
   5304 TO    5320  359        7304 TO    7314   67     00,3160 TO 00,3226  106     04,2120 TO 04,2200  296
   5321 TO    5340  360        7315 TO    7353   68     00,3227 TO 00,3271  107     04,2201 TO 04,2247  297
   5341 TO    5412  361        7354 TO    7377   69     00,3272 TO 00,3332  108     04,2250 TO 04,2323  298

   5413 TO    5445  366        7400 TO    7433   70     00,3333 TO 00,3403  109     04,2324 TO 04,2366  299
   5446 TO    5467  367        7434 TO    7472   71     00,3404 TO 00,3444  110     04,2367 TO 04,2430  300
   5470 TO    5511  473        7473 TO    7517   72     00,3445 TO 00,3500  111     04,2431 TO 04,2503  301
   5512 TO    5513  642        7520 TO    7551   73     00,3501 TO 00,3535  112     04,2504 TO 04,2554  302
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OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE        OCCUPIED LOCATIONS  PAGE

04,2555  TO 04,2604  315        05,3131  TO 05,3176  329        10,2051  TO 10,2114  232        11,2475  TO 11,2523  271
04,2605  TO 04,2653  316        05,3177  TO 05,3221  330        10,2115  TO 10,2147  233        11,2524  TO 11,2565  272
04,2654  TO 04,2707  317        05,3222  TO 05,3245  332        10,2150  TO 10,2212  234        11,2566  TO 11,2633  273
04,2710  TO 04,2722  318        05,3246  TO 05,3266  333        10,2213  TO 10,2246  235        11,2634  TO 11,2703  274

04,2723  TO 04,2742  324        05,3267  TO 05,3301  335        10,2247  TO 10,2305  236        11,2704  TO 11,2737  275
04,2743  TO 04,3015  325        05,3302  TO 05,3337  336        10,2306  TO 10,2330  237        11,2740  TO 11,3000  276
04,3016  TO 04,3065  326        05,3340  TO 05,3343  337        10,2331  TO 10,2350  238        11,3001  TO 11,3027  277
04,3066  TO 04,3100  327        05,3344  TO 05,3402  341        10,2351  TO 10,2362  239        11,3030  TO 11,3060  278

04,3101  TO 04,3154  331        05,3403  TO 05,3413  343        10,2363  TO 10,2421  240        11,3061  TO 11,3127  279
04,3155  TO 04,3200  332        05,3414  TO 05,3457  363        10,2422  TO 10,2466  241        11,3130  TO 11,3141  280
04,3201  TO 04,3216  333        05,3460  TO 05,3520  364        10,2467  TO 10,2506  242        11,3142  TO 11,3206  281
04,3217  TO 04,3267  334        05,3521  TO 05,3523  365        10,2507  TO 10,2543  243                    11,3207  282

04,3270  TO 04,3307  335        05,3524  TO 05,3525  642        10,2544  TO 10,2572  244        11,3210  TO 11,3260  283
04,3310  TO 04,3333  337        06,2000  TO 06,2034  431        10,2573  TO 10,2635  245        11,3261  TO 11,3263  284
04,3334  TO 04,3414  338        06,2035  TO 06,2060  432        10,2636  TO 10,2651  246        11,3264  TO 11,3340  368
04,3415  TO 04,3421  339        06,2061  TO 06,2120  433        10,2652  TO 10,2706  247        11,3341  TO 11,3360  369

04,3422  TO 04,3435  343        06,2121  TO 06,2173  434        10,2707  TO 10,2754  248        11,3361  TO 11,3362  642
04,3436  TO 04,3453  344        06,2174  TO 06,2213  435        10,2755  TO 10,3023  249        12,2000  TO 12,2045  151
04,3454  TO 04,3475  359        06,2214  TO 06,2253  436        10,3024  TO 10,3076  250        12,2046  TO 12,2071  152
04,3476  TO 04,3517  360        06,2254  TO 06,2310  437        10,3077  TO 10,3110  251        12,2072  TO 12,2143  153

04,3520  TO 04,3537  362        06,2311  TO 06,2344  438        10,3111  TO 10,3136  252        12,2144  TO 12,2212  154
04,3540  TO 04,3541  642        06,2345  TO 06,2420  439        10,3137  TO 10,3171  253                    12,2213  155
05,2000  TO 05,2033  303        06,2421  TO 06,2430  440        10,3172  TO 10,3234  254        12,2214  TO 12,2266  156
05,2034  TO 05,2112  304        06,2431  TO 06,2461  441        10,3235  TO 10,3253  255        12,2267  TO 12,2343  157

05,2113  TO 05,2170  305        06,2462  TO 06,2522  442        10,3254  TO 10,3316  256        12,2344  TO 12,2411  158
05,2171  TO 05,2175  306        06,2523  TO 06,2554  443        10,3317  TO 10,3340  257        12,2412  TO 12,2450  159
05,2176  TO 05,2240  307        06,2555  TO 06,2556  642        10,3341  TO 10,3342  642        12,2451  TO 12,2500  162
05,2241  TO 05,2311  308        07,2000  TO 07,2044  211        11,2000  TO 11,2050  258        12,2501  TO 12,2546  163

05,2312  TO 05,2325  309        07,2045  TO 07,2112  212        11,2051  TO 11,2107  259        12,2547  TO 12,2564  164
05,2326  TO 05,2402  312        07,2113  TO 07,2155  213        11,2110  TO 11,2131  260        12,2565  TO 12,2631  165
05,2403  TO 05,2452  313        07,2156  TO 07,2210  214        11,2132  TO 11,2153  261        12,2632  TO 12,2706  166
05,2453  TO 05,2524  314        07,2211  TO 07,2256  215        11,2154  TO 11,2203  262        12,2707  TO 12,2717  167

05,2525  TO 05,2534  315        07,2257  TO 07,2321  216        11,2204  TO 11,2233  263        12,2720  TO 12,2767  168
05,2535  TO 05,2604  319        07,2322  TO 07,2361  217        11,2234  TO 11,2265  264        12,2770  TO 12,3036  169
05,2605  TO 05,2662  320        07,2362  TO 07,2401  285        11,2266  TO 11,2302  265        12,3037  TO 12,3102  170
05,2663  TO 05,2733  321        07,2402  TO 07,2460  286        11,2303  TO 11,2326  266        12,3103  TO 12,3142  171

05,2734  TO 05,3006  322        07,2461  TO 07,2501  287        11,2327  TO 11,2376  267        12,3143  TO 12,3204  172
05,3007  TO 05,3052  323        07,2502  TO 07,2503  642        11,2377  TO 11,2402  268        12,3205  TO 12,3253  173
05,3053  TO 05,3076  324        10,2000  TO 10,2012  230        11,2403  TO 11,2450  269        12,3254  TO 12,3321  174
05,3077  TO 05,3130  328        10,2013  TO 10,2050  231        11,2451  TO 11,2474  270        12,3322  TO 12,3343  175
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12,3344  TO 12,3405  176       13,3315  TO 13,3371  225       15,2253  TO 15,2320  375       16,2620  TO 16,2662  502
12,3406  TO 12,3437  177       13,3372  TO 13,3433  226       15,2321  TO 15,2366  376       16,2663  TO 16,2730  503
12,3440  TO 12,3500  178       13,3434  TO 13,3435  642       15,2367  TO 15,2425  404       16,2731  TO 16,2772  504
12,3501  TO 12,3520  179       14,2000  TO 14,2043  444       15,2426  TO 15,2437  405       16,2773  TO 16,3022  505

12,3521  TO 12,3544  180       14,2044  TO 14,2115  445       15,2440  TO 15,2472  406       16,3023  TO 16,3067  506
12,3545  TO 12,3561  181       14,2116  TO 14,2134  446       15,2473  TO 15,2516  407       16,3070  TO 16,3101  507
12,3562  TO 12,3621  182       14,2135  TO 14,2207  447       15,2517  TO 15,2542  408       16,3102  TO 16,3131  508
12,3622  TO 12,3635  184       14,2210  TO 14,2246  448       15,2543  TO 15,2606  409       16,3132  TO 16,3166  509

            12,3636  185       14,2247  TO 14,2315  449       15,2607  TO 15,2614  410       16,3167  TO 16,3232  510
12,3637  TO 12,3647  186       14,2316  TO 14,2324  450       15,2615  TO 15,2657  411       16,3233  TO 16,3257  511
12,3650  TO 12,3711  187       14,2325  TO 14,2376  451       15,2660  TO 15,2676  412       16,3260  TO 16,3327  512
12,3712  TO 12,3751  188       14,2377  TO 14,2404  452       15,2677  TO 15,2735  413       16,3330  TO 16,3361  513

12,3752  TO 12,3766  636       14,2405  TO 14,2453  453       15,2736  TO 15,2765  414       16,3362  TO 16,3363  643
12,3767  TO 12,3770  642       14,2454  TO 14,2527  454       15,2766  TO 15,3017  415       17,2000  TO 17,2046  475
13,2000  TO 13,2034  190       14,2530  TO 14,2575  455       15,3020  TO 15,3050  416       17,2047  TO 17,2126  476
13,2035  TO 13,2054  191       14,2576  TO 14,2643  456       15,3051  TO 15,3113  417       17,2127  TO 17,2207  477

13,2055  TO 13,2121  192       14,2644  TO 14,2705  457       15,3114  TO 15,3166  418       17,2210  TO 17,2244  478
13,2122  TO 13,2152  193       14,2706  TO 14,2726  458       15,3167  TO 15,3172  419       17,2245  TO 17,2321  479
13,2153  TO 13,2205  194       14,2727  TO 14,2757  459       15,3173  TO 15,3237  420       17,2322  TO 17,2401  480
13,2206  TO 13,2226  195       14,2760  TO 14,3027  460       15,3240  TO 15,3242  421       17,2402  TO 17,2444  481

13,2227  TO 13,2265  196       14,3030  TO 14,3061  461       15,3243  TO 15,3266  422       17,2445  TO 17,2525  482
13,2266  TO 13,2316  197       14,3062  TO 14,3122  462       15,3267  TO 15,3313  423       17,2526  TO 17,2604  483
13,2317  TO 13,2363  198       14,3123  TO 14,3175  463       15,3314  TO 15,3341  424       17,2605  TO 17,2661  484
13,2364  TO 13,2401  199       14,3176  TO 14,3253  464       15,3342  TO 15,3403  425       17,2662  TO 17,2736  485

13,2402  TO 13,2437  200       14,3254  TO 14,3323  465       15,3404  TO 15,3441  426       17,2737  TO 17,2770  486
13,2440  TO 13,2472  201       14,3324  TO 14,3360  466       15,3442  TO 15,3453  427       17,2771  TO 17,3051  487
13,2473  TO 13,2535  202       14,3361  TO 14,3441  467       15,3454  TO 15,3514  428       17,3052  TO 17,3062  488
13,2536  TO 13,2605  203       14,3442  TO 14,3522  468       15,3515  TO 15,3521  429       17,3063  TO 17,3123  489

13,2606  TO 13,2632  204       14,3523  TO 14,3561  469       15,3522  TO 15,3574  430       17,3124  TO 17,3204  490
13,2633  TO 13,2663  205       14,3562  TO 14,3612  470       15,3575  TO 15,3576  643       17,3205  TO 17,3261  491
13,2664  TO 13,2711  206       14,3613  TO 14,3642  471       16,2000  TO 16,2036  347       17,3262  TO 17,3343  492
13,2712  TO 13,2742  207       14,3643  TO 14,3702  472       16,2037  TO 16,2107  348       17,3344  TO 17,3421  493

13,2743  TO 13,2752  208       14,3703  TO 14,3725  474       16,2110  TO 16,2162  349       17,3422  TO 17,3457  494
13,2753  TO 13,3021  218                   14,3726  642       16,2163  TO 16,2242  350       17,3460  TO 17,3523  495
13,3022  TO 13,3077  219                   14,3727  643       16,2243  TO 16,2321  351       17,3524  TO 17,3573  496
13,3100  TO 13,3153  220       15,2000  TO 15,2046  370       16,2322  TO 16,2377  352       17,3574  TO 17,3625  497

13,3154  TO 13,3160  221       15,2047  TO 15,2115  371       16,2400  TO 16,2454  353       17,3626  TO 17,3703  498
13,3161  TO 13,3235  222       15,2116  TO 15,2166  372       16,2455  TO 16,2517  354       17,3704  TO 17,3727  499
13,3236  TO 13,3311  223       15,2167  TO 15,2211  373       16,2520  TO 16,2555  500       17,3730  TO 17,3731  643
13,3312  TO 13,3314  224       15,2212  TO 15,2252  374       16,2556  TO 16,2617  501       20,2000  TO 20,2015  377
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20,2016  TO 20,2066  378       21,2754  TO 21,3041  527       24,2426  TO 24,2502  569       25,3134  TO 25,3205  631
20,2067  TO 20,2140  379       21,3042  TO 21,3044  528       24,2503  TO 24,2553  570       25,3206  TO 25,3262  632
20,2141  TO 20,2211  380       21,3045  TO 21,3106  529       24,2554  TO 24,2631  571       25,3263  TO 25,3340  633
20,2212  TO 20,2263  381       21,3107  TO 21,3165  530       24,2632  TO 24,2712  572       25,3341  TO 25,3415  634

20,2264  TO 20,2341  382       21,3166  TO 21,3241  531       24,2713  TO 24,2734  573       25,3416  TO 25,3442  636
20,2342  TO 20,2414  383       21,3242  TO 21,3313  532       24,2735  TO 24,2742  574       25,3443  TO 25,3514  637
20,2415  TO 20,2473  384       21,3314  TO 21,3370  533       24,2743  TO 24,2770  575       25,3515  TO 25,3524  638
20,2474  TO 20,2553  385       21,3371  TO 21,3426  534       24,2771  TO 24,3036  576       25,3525  TO 25,3573  639

20,2554  TO 20,2626  386       21,3427  TO 21,3430  643       24,3037  TO 24,3104  577       25,3574  TO 25,3643  640
20,2627  TO 20,2701  387       23,2000  TO 23,2050  542       24,3105  TO 24,3155  578       25,3644  TO 25,3662  641
20,2702  TO 20,2754  388       23,2051  TO 23,2107  543       24,3156  TO 24,3225  579       25,3663  TO 25,3664  643
20,2755  TO 20,3027  389       23,2110  TO 23,2155  544       24,3226  TO 24,3277  580       26,2000  TO 26,2032  604

20,3030  TO 20,3101  390       23,2156  TO 23,2233  545       24,3300  TO 24,3352  581       26,2033  TO 26,2103  605
20,3102  TO 20,3150  391       23,2234  TO 23,2306  546       24,3353  TO 24,3425  582       26,2104  TO 26,2125  606
20,3151  TO 20,3227  392       23,2307  TO 23,2353  547       24,3426  TO 24,3465  583       26,2126  TO 26,2160  607
20,3230  TO 20,3303  393       23,2354  TO 23,2424  548       24,3466  TO 24,3524  584       26,2161  TO 26,2233  608

20,3304  TO 20,3350  394       23,2425  TO 23,2472  549       24,3525  TO 24,3572  585       26,2234  TO 26,2303  609
20,3351  TO 20,3426  395       23,2473  TO 23,2547  550       24,3573  TO 24,3642  586       26,2304  TO 26,2361  610
20,3427  TO 20,3501  396       23,2550  TO 23,2623  551       24,3643  TO 24,3651  587       26,2362  TO 26,2402  611
20,3502  TO 20,3550  397       23,2624  TO 23,2673  552       24,3652  TO 24,3714  592       26,2403  TO 26,2453  612

20,3551  TO 20,3621  398       23,2674  TO 23,2751  553       24,3715  TO 24,3722  593       26,2454  TO 26,2534  613
20,3622  TO 20,3675  399       23,2752  TO 23,3032  554       24,3723  TO 24,3724  643       26,2535  TO 26,2563  614
20,3676  TO 20,3751  400       23,3033  TO 23,3111  555       25,2000  TO 25,2043  588       26,2564  TO 26,2617  615
20,3752  TO 20,3755  401       23,3112  TO 23,3140  556       25,2044  TO 25,2121  589       26,2620  TO 26,2663  616

20,3756  TO 20,3757  643       23,3141  TO 23,3205  557       25,2122  TO 25,2173  590       26,2664  TO 26,2732  617
21,2000  TO 21,2041  514       23,3206  TO 23,3260  558       25,2174  TO 25,2215  591       26,2733  TO 26,2764  618
21,2042  TO 21,2103  515       23,3261  TO 23,3326  559       25,2216  TO 25,2264  594       26,2765  TO 26,3027  619
21,2104  TO 21,2157  516       23,3327  TO 23,3377  560       25,2265  TO 25,2343  595       26,3030  TO 26,3100  620

21,2160  TO 21,2241  517       23,3400  TO 23,3410  561       25,2344  TO 25,2413  596       26,3101  TO 26,3155  621
21,2242  TO 21,2313  518       23,3411  TO 23,3412  643       25,2414  TO 25,2475  597       26,3156  TO 26,3226  622
21,2314  TO 21,2375  519       24,2000  TO 24,2031  562       25,2476  TO 25,2557  598       26,3227  TO 26,3300  623
21,2376  TO 21,2457  520       24,2032  TO 24,2103  563       25,2560  TO 25,2636  599       26,3301  TO 26,3350  624

21,2460  TO 21,2536  521       24,2104  TO 24,2165  564       25,2637  TO 25,2720  600       26,3351  TO 26,3415  625
21,2537  TO 21,2602  522       24,2166  TO 24,2240  565       25,2721  TO 25,2775  601       26,3416  TO 26,3441  626
21,2603  TO 21,2654  523       24,2241  TO 24,2303  566       25,2776  TO 25,3046  602       26,3442  TO 26,3477  628
21,2655  TO 21,2665  524       24,2304  TO 24,2354  567       25,3047  TO 25,3063  603       26,3500  TO 26,3520  629

21,2666  TO 21,2724  525       24,2355  TO 24,2425  568       25,3064  TO 25,3133  630       26,3521  TO 26,3522  643
21,2725  TO 21,2763  526
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

    4000  TO     4377       PARAGRAPH # 010           ROPE MODULE 1, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
    4400  TO     4777       PARAGRAPH # 011           ROPE MODULE 1, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
    5000  TO     5377       PARAGRAPH # 012           ROPE MODULE 1, SIDE A, SENSE LINE SET 06 (WIRES 81-96)
    5400  TO     5777       PARAGRAPH # 013           ROPE MODULE 1, SIDE B, SENSE LINE SET 06 (WIRES 81-96)

    6000  TO     6377       PARAGRAPH # 014           ROPE MODULE 1, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
    6400  TO     6777       PARAGRAPH # 015           ROPE MODULE 1, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
    7000  TO     7377       PARAGRAPH # 016           ROPE MODULE 1, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
    7400  TO     7777       PARAGRAPH # 017           ROPE MODULE 1, SIDE B, SENSE LINE SET 08 (WIRES 113-128)

 00,2000  TO 00,2377        PARAGRAPH # 020           ROPE MODULE 1, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
 00,2400  TO 00,2777        PARAGRAPH # 021           ROPE MODULE 1, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
 00,3000  TO 00,3377        PARAGRAPH # 022           ROPE MODULE 1, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
 00,3400  TO 00,3777        PARAGRAPH # 023           ROPE MODULE 1, SIDE B, SENSE LINE SET 02 (WIRES 17-32)

 01,2000  TO 01,2377        PARAGRAPH # 024           ROPE MODULE 1, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
 01,2400  TO 01,2777        PARAGRAPH # 025           ROPE MODULE 1, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
 01,3000  TO 01,3377        PARAGRAPH # 026           ROPE MODULE 1, SIDE A, SENSE LINE SET 04 (WIRES 49-64)

 04,2000  TO 04,2377        PARAGRAPH # 040           ROPE MODULE 1, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
 04,2400  TO 04,2777        PARAGRAPH # 041           ROPE MODULE 1, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
 04,3000  TO 04,3377        PARAGRAPH # 042           ROPE MODULE 1, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
 04,3400  TO 04,3777        PARAGRAPH # 043           ROPE MODULE 1, SIDE B, SENSE LINE SET 10 (WIRES 145-160)

 05,2000  TO 05,2377        PARAGRAPH # 044           ROPE MODULE 1, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
 05,2400  TO 05,2777        PARAGRAPH # 045           ROPE MODULE 1, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
 05,3000  TO 05,3377        PARAGRAPH # 046           ROPE MODULE 1, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
 05,3400  TO 05,3777        PARAGRAPH # 047           ROPE MODULE 1, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

 06,2000  TO 06,2377        PARAGRAPH # 050           ROPE MODULE 2, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
 06,2400  TO 06,2777        PARAGRAPH # 051           ROPE MODULE 2, SIDE B, SENSE LINE SET 01 (WIRES 1-16)

 07,2000  TO 07,2377        PARAGRAPH # 054           ROPE MODULE 2, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
 07,2400  TO 07,2777        PARAGRAPH # 055           ROPE MODULE 2, SIDE B, SENSE LINE SET 03 (WIRES 33-48)

 10,2000  TO 10,2377        PARAGRAPH # 060           ROPE MODULE 2, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
 10,2400  TO 10,2777        PARAGRAPH # 061           ROPE MODULE 2, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
 10,3000  TO 10,3377        PARAGRAPH # 062           ROPE MODULE 2, SIDE A, SENSE LINE SET 06 (WIRES 81-96)

 11,2000  TO 11,2377        PARAGRAPH # 064           ROPE MODULE 2, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
 11,2400  TO 11,2777        PARAGRAPH # 065           ROPE MODULE 2, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
 11,3000  TO 11,3377        PARAGRAPH # 066           ROPE MODULE 2, SIDE A, SENSE LINE SET 08 (WIRES 113-128)

 12,2000  TO 12,2377        PARAGRAPH # 070           ROPE MODULE 2, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
 12,2400  TO 12,2777        PARAGRAPH # 071           ROPE MODULE 2, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
 12,3000  TO 12,3377        PARAGRAPH # 072           ROPE MODULE 2, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
 12,3400  TO 12,3777        PARAGRAPH # 073           ROPE MODULE 2, SIDE B, SENSE LINE SET 10 (WIRES 145-160)

 13,2000  TO 13,2377        PARAGRAPH # 074           ROPE MODULE 2, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
 13,2400  TO 13,2777        PARAGRAPH # 075           ROPE MODULE 2, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

13,3000  TO 13,3777      PARAGRAPH # 076          ROPE MODULE 2, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
13,3400  TO 13,3777      PARAGRAPH # 077          ROPE MODULE 2, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

14,2000  TO 14,2377      PARAGRAPH # 100          ROPE MODULE 3, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
14,2400  TO 14,2777      PARAGRAPH # 101          ROPE MODULE 3, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
14,3000  TO 14,3377      PARAGRAPH # 102          ROPE MODULE 3, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
14,3400  TO 14,3777      PARAGRAPH # 103          ROPE MODULE 3, SIDE B, SENSE LINE SET 02 (WIRES 17-32)

15,2000  TO 15,2377      PARAGRAPH # 104          ROPE MODULE 3, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
15,2400  TO 15,2777      PARAGRAPH # 105          ROPE MODULE 3, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
15,3000  TO 15,3377      PARAGRAPH # 106          ROPE MODULE 3, SIDE A, SENSE LINE SET 04 (WIRES 49-64)
15,3400  TO 15,3777      PARAGRAPH # 107          ROPE MODULE 3, SIDE B, SENSE LINE SET 04 (WIRES 49-64)

16,2000  TO 16,2377      PARAGRAPH # 110          ROPE MODULE 3, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
16,2400  TO 16,2777      PARAGRAPH # 111          ROPE MODULE 3, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
16,3000  TO 16,3377      PARAGRAPH # 112          ROPE MODULE 3, SIDE A, SENSE LINE SET 06 (WIRES 81-96)

17,2000  TO 17,2377      PARAGRAPH # 114          ROPE MODULE 3, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
17,2400  TO 17,2777      PARAGRAPH # 115          ROPE MODULE 3, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
17,3000  TO 17,3377      PARAGRAPH # 116          ROPE MODULE 3, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
17,3400  TO 17,3777      PARAGRAPH # 117          ROPE MODULE 3, SIDE B, SENSE LINE SET 08 (WIRES 113-128)

20,2000  TO 20,2377      PARAGRAPH # 120          ROPE MODULE 3, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
20,2400  TO 20,2777      PARAGRAPH # 121          ROPE MODULE 3, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
20,3000  TO 20,3377      PARAGRAPH # 122          ROPE MODULE 3, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
20,3400  TO 20,3777      PARAGRAPH # 123          ROPE MODULE 3, SIDE B, SENSE LINE SET 10 (WIRES 145-160)

21,2000  TO 21,2377      PARAGRAPH # 124          ROPE MODULE 3, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
21,2400  TO 21,2777      PARAGRAPH # 125          ROPE MODULE 3, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
21,3000  TO 21,3377      PARAGRAPH # 126          ROPE MODULE 3, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
21,3400  TO 21,3777      PARAGRAPH # 127          ROPE MODULE 3, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

23,2000  TO 23,2377      PARAGRAPH # 134          ROPE MODULE 4, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
23,2400  TO 23,2777      PARAGRAPH # 135          ROPE MODULE 4, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
23,3000  TO 23,3377      PARAGRAPH # 136          ROPE MODULE 4, SIDE A, SENSE LINE SET 04 (WIRES 49-64)
23,3400  TO 23,3777      PARAGRAPH # 137          ROPE MODULE 4, SIDE B, SENSE LINE SET 04 (WIRES 49-64)

24,2000  TO 24,2377      PARAGRAPH # 140          ROPE MODULE 4, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
24,2400  TO 24,2777      PARAGRAPH # 141          ROPE MODULE 4, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
24,3000  TO 24,3377      PARAGRAPH # 142          ROPE MODULE 4, SIDE A, SENSE LINE SET 06 (WIRES 81-96)
24,3400  TO 24,3777      PARAGRAPH # 143          ROPE MODULE 4, SIDE B, SENSE LINE SET 06 (WIRES 81-96)

25,2000  TO 25,2377      PARAGRAPH # 144          ROPE MODULE 4, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
25,2400  TO 25,2777      PARAGRAPH # 145          ROPE MODULE 4, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
25,3000  TO 25,3377      PARAGRAPH # 146          ROPE MODULE 4, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
25,3400  TO 25,3777      PARAGRAPH # 147          ROPE MODULE 4, SIDE B, SENSE LINE SET 08 (WIRES 113-128)

26,2000  TO 26,2377      PARAGRAPH # 150          ROPE MODULE 4, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
26,2400  TO 26,2777      PARAGRAPH # 151          ROPE MODULE 4, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
26,3000  TO 26,3377      PARAGRAPH # 152          ROPE MODULE 4, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

26,3400  TO 26,3777      PARAGRAPH # 153         ROPE MODULE 4, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
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OCTAL LISTING OF PARAGRAPH # 010, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

  4000        00004 0      34054 1      56006 1      12072 1      52011 0      00006 1      22012 1      14175 1
  4010        52011 0      00006 1      30346 0      52006 0      52011 0      34056 0      56006 1      12736 0
  4020        52011 0      37665 0      14713 1   C: 24006 1      52011 0      34057 1      56006 1      12362 0
  4030        52011 0      34060 0      56006 1      13161 0      52011 0      34057 1      56006 1      12402 1

  4040        52011 0      34061 1      56006 1      12047 1      52011 0      34062 1      56006 1      12707 1
  4050        52011 0      37656 0      54773 0      14610 0   C: 24003 1   C: 04000 0   C: 02003 0   C: 16000 0
  4060     C: 26003 0   C: 32007 1   C: 20001 1      52120 0      50002 0      30000 1      24002 0      54001 1
  4070        22004 0      76426 0      56002 0      52120 0      50002 0      02000 0      56120 1      56004 0

  4100        56120 1      00117 0      56002 0      50000 1      30000 1      54004 1      76426 0      56002 0
  4110        50002 0      12000 1      36426 1      70117 1      60120 1      00002 0      54001 1      22004 0
  4120        22121 0      76426 0      00006 1      50000 1      32001 1      56121 0      54004 1      30121 0
  4130        00002 0      56002 0      54150 1      30004 0      54151 0      37650 0      54023 1      30002 0

  4140        00150 0      54150 1      37650 0      54023 1      30004 0      54151 0      50002 0      30000 1
  4150        54004 1      76426 0      56002 0      56150 0      50002 0      12000 1      52077 0      50002 0
  4160        30000 1      24002 0      54001 1      22004 0      76426 0      56002 0      52077 0      50002 0
  4170        02000 0      56077 1      56004 0      56077 1      00076 0      04177 1      14606 1      10031 1

  4200        00002 0      00002 0      00002 0      37665 0      56767 1      56766 0      54031 1      00006 1
  4210        14230 0      37641 0      00006 1      05013 0      37665 0      56772 0      56771 0      56770 1
  4220        00006 1      64225 0      00006 1      01006 0      00002 0      00006 1      01005 0      00002 0
  4230        30770 1      14220 1      67642 0      55105 0      14236 0      41105 0      60000 1      55105 0

  4240        14251 1      57105 1      51105 1      67640 1      40000 0      61105 1      55105 0      14251 1
  4250        14267 1      00006 1      71105 0      55106 0      00006 1      74274 0      64273 0      00006 1
  4260        71106 0      64272 1      00006 1      71105 0      20001 1      55105 0      00002 0      50000 1
  4270        47640 0      00002 0   C: 31103 1   C: 65552 0   C: 01124 1      55107 1      10000 0      14303 1

  4300        00002 0      24002 0      00002 0      00006 1      23106 1      64362 1      54000 0      14351 0
  4310        57107 0      55107 1      54021 0      56021 1      55105 0      64360 0      10000 0      64361 1
  4320        04325 1      14322 1      37645 1      61107 0      60000 1      04340 1      04340 1      57106 1
  4330        10000 0      57106 1      04336 0      57106 1      00006 1      77644 1      51106 1      00001 0

  4340        56021 1      41105 0      22007 0      00006 1      10021 0      56021 1      00006 1      60021 1
  4350        00002 0      41106 0      55106 0      37651 1      00006 1      71107 1      30001 0      04311 0
  4360     C: 73777 1   C: 24001 0   C: 37401 0      54070 1      00006 1      50002 0      30001 0      52073 1
  4370        34447 1      56004 0      54065 0      12242 0      54070 1      00006 1      50002 0      30001 0
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OCTAL LISTING OF PARAGRAPH # 011, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

   4400        52073 1     34447 1     56004 0     12220 1     34447 1     54001 1     30002 0     22006 1
   4410        00004 0     12320 0     34447 1     54001 1     40150 1     14407 1     54150 1     34447 1
   4420        54004 1     12403 0     54072 0     47656 1     26002 1     34447 1     56004 0     12414 0
   4430        00004 0     54070 1     34447 1     56006 1     54151 0     30002 0     12463 0     05401 1

   4440        34447 1     54004 1     12474 0     30065 1     54004 1     50002 0     00002 0  C: 02220 0
   4450        47665 1     54067 1     00003 1     47656 1     00006 1     03011 1     14461 1     00006 1
   4460        23360 0     10067 1     14474 0     37656 0     14470 1     34503 0     54006 0     01360 0
   4470        00006 1     05011 1     52151 0     52006 0     37656 0     00006 1     05011 1     34447 1

   4500        54004 1     00004 0     12317 1  C: 40002 1  C: 03000 1  C: 05000 1  C: 06000 1  C: 07000 0
   4510     C: 11000 1  C: 12000 1  C: 13000 0  C: 14000 1  C: 15000 0  C: 16000 0  C: 17000 1  C: 21000 1
   4520     C: 22000 1  C: 23000 0  C: 24000 1  C: 25000 0  C: 26000 0  C: 27000 1  C: 30000 1  C: 31000 0
   4530     C: 32000 0  C: 33000 1  C: 34000 0  C: 35000 1  C: 36000 1  C: 37000 0     56002 0     54065 0

   4540        00006 1     50000 1     30001 0     54070 1     34553 0     56006 1     12566 1     30066 1
   4550        54006 0     50065 1     00002 0  C: 02003 0     50002 0     30000 1     24002 0     56002 0
   4560        54070 1     30006 1     54001 1     34566 0     54065 0     14544 1     14600 1  C: 73206 1
   4570     C: 73774 1     10063 0     14602 0     14602 0     14575 0     34533 0     04363 0  C: 02257 0

   4600     C: 16003 0     14602 0     11070 0     34553 0     54006 0     12741 0     00006 1     22012 1
   4610        30016 0     54006 0     52011 0     50017 1     00004 0     50002 0     30000 1     54077 0
   4620        75224 1     60000 1     56077 1     00006 1     77647 1     14634 0     00004 0     54077 0
   4630        50002 0     30000 1     60000 1     56077 1     54001 1     40000 0     50077 1     53072 1

   4640        00006 1     64655 0     54074 0     00006 1     22075 0     30077 1     00006 1     77642 1
   4650        50000 1     34661 1     04162 0     52075 1     22002 0     40000 0     00003 1     50002 0
   4660        00001 0  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1     50002 0
   4670        30000 1     24002 0     56276 1     40000 0     60276 1     00006 1     14712 0     34701 0

   4700        14067 0  C: 12001 0     50002 0     40000 0     60276 1     00006 1     14711 0     50002 0
   4710        00001 0     50002 0     00002 0     00006 1     01010 1     50347 1     10000 0     10350 0
   4720        14722 0     37663 0     54350 0     34023 1     56006 1     12451 1     34735 1     14731 1
   4730        34736 1     54027 0     34737 0     54347 0     14612 1  C: 37767 0  C: 37766 1  C: 04717 1

   4740     C: 74000 1  C: 04025 1  C: 10003 0  C: 14031 0  C: 20033 0  C: 24017 1  C: 30036 1  C: 34034 1
   4750     C: 40023 1  C: 44035 1  C: 50037 0  C: 54000 0  C: 60000 1     37665 0     54032 1     54033 0
   4760        54034 1     00002 0  C: 00454 1     00006 1     64766 1     14767 1     40000 0     50002 0
   4770        60000 1     00006 1     64775 0     50002 0     00001 0     50002 0     00002 0     50002 0
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OCTAL LISTING OF PARAGRAPH # 012, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

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  5000        30000 1      24002 0      00006 1      50000 1      30001 0      52066 0      22002 0      37644 0
  5010        70413 0      10000 0      15025 1      30065 1      04763 1   C: 66161 1      00001 0      35037 0
  5020        60066 1      04763 1   C: 64420 0      00001 0      05035 1      35041 1      60066 1      04763 1
  5030     C: 65673 0      00001 0      30065 1      04763 1   C: 54343 1      50001 0      00001 0   C: 00765 0

  5040     C: 00707 1   C: 16450 1      37657 1      70370 1      10000 0      00002 0      35076 0      70413 0
  5050        00006 1      15061 1      40413 0      75077 0      00006 1      15061 1      37654 1      70413 0
  5060        10000 0      37650 0      60322 1      77650 1      00006 1      14712 0      54001 1      30322 1
  5070        00006 1      06001 0      77637 0      67641 0      54322 0      00002 0   C: 10102 0   C: 00220 1

  5100        35106 0      70305 0      54107 0      05123 1      05105 0      04440 0   C: 07700 1      54107 0
  5110        10277 1      00002 0      30002 0      67657 1      54325 1      05131 1      35122 0      56006 1
  5120        54326 1      02000 0   C: 12000 1      30002 0      67657 1      54325 1      05116 1      52326 1
  5130        52006 0      47641 1      00004 0      70306 0      67641 0      54306 0      00003 1      00002 0

  5140        37657 1      54277 1      22004 0      56002 0      52120 0      04112 1      54323 1      04416 0
  5150        04440 0      10301 1      15157 0      15140 0      00002 0      50002 0      00002 0      50002 0
  5160        00001 0      54304 1      54003 0      75235 1      65236 0      54131 0      00002 0      30304 0
  5170        15162 0      54003 0      75235 1      65236 0      00002 0   C: 00016 0   C: 00011 1   C: 00004 0

  5200        54020 1      40020 1      40020 1      40020 1      40020 1      56020 0      00002 0      54022 0
  5210        40022 0      40022 0      40022 0      40022 0      56022 1      00002 0      60000 1      60000 1
  5220        60000 1      60000 1      60000 1      00002 0   C: 00037 0   C: 01740 0   C: 76000 0      04363 0
  5230        04536 0      04602 1      04374 0   C: 30000 1   C: 03777 0   C: 00377 1   C: 01400 1   C: 00023 0

  5240     C: 00021 1   C: 00025 0   C: 00012 1      37651 1      00006 1      05011 1      00002 0      47651 0
  5250        00006 1      03011 1      00002 0      37653 0      00006 1      05011 1      00002 0      00006 1
  5260        30025 0      52014 0      00002 0      00006 1      30142 0      20142 1      60140 1      26140 0
  5270        54007 1      00002 0      54105 1      00002 0      37652 1      00006 1      05011 1      00002 0

  5300        47652 0      00006 1      03011 1      00002 0      10324 0      00002 0      37657 1      54324 0
  5310        50002 0      00001 0      36426 1      70002 1      60004 0      04102 0   C: 10000 0      10324 0
  5320        15312 0      37657 1      54324 0      00002 0      45331 1      60002 0      60004 0      04102 0
  5330     C: 10001 1   C: 02003 0      54107 0      10277 1      15337 1      30002 0      15114 1      24002 0

  5340        15324 0      56002 0      54130 1      37667 1      60324 1      00006 1      65354 0      05367 0
  5350        05354 0      04422 1      37657 1      54324 0      00004 0      47653 1      00006 1      03011 1
  5360        37665 0      54277 1      00003 1      00130 0      56002 0      54130 1      05354 0      37665 0
  5370        56327 1      56330 1      56331 0      00006 1      15400 1      00004 0      50002 0      00001 0
```

OCTAL LISTING OF PARAGRAPH # 013, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
5400      00002 0      56002 0      54130 1      00004 0      35412 0      04536 0   C: 03520 0   C: 10000 0
5410      00003 1      00130 0   C: 01130 1      00004 0      56002 0      54077 0      11363 1      05425 1
5420      05430 0      30077 1      00003 1      50000 1      00001 0      66042 1      55363 1      05421 0
5430      05440 1      34535 0      04363 0   C: 02773 0   C: 02002 1      50077 1      30000 1      05426 1

5440      45445 0      70322 0      65445 1      54322 0      00002 0   C: 40400 1      00004 0      50002 0
5450      30000 1      54065 0      11363 1      05456 0      05460 0      05455 0      66042 1      05462 1
5460      05440 1      56065 1      55363 1      05455 0      56002 0      55364 0      05446 1   C; 01103 1
5470      00004 0      00006 1      00004 0      54001 1      00006 1      06004 0      00006 1      15503 0

5500      00006 1      00004 0      54001 1      47637 0      60001 0      00006 1      15471 1      00006 1
5510      00003 1      00002 0      05512 1      05513 0 CKSM 63274 0        @            @            @
5520        @            @            @            @            @            @            @            @
5530        @            @            @            @            @            @            @            @

5540        @            @            @            @            @            @            @            @
5550        @            @            @            @            @            @            @            @
5560        @            @            @            @            @            @            @            @
5570        @            @            @            @            @            @            @            @

5600        @            @            @            @            @            @            @            @
5610        @            @            @            @            @            @            @            @
5620        @            @            @            @            @            @            @            @
5630        @            @            @            @            @            @            @            @

5640        @            @            @            @            @            @            @            @
5650        @            @            @            @            @            @            @            @
5660        @            @            @            @            @            @            @            @
5670        @            @            @            @            @            @            @            @

5700        @            @            @            @            @            @            @            @
5710        @            @            @            @            @            @            @            @
5720        @            @            @            @            @            @            @            @
5730        @            @            @            @            @            @            @            @

5740        @            @            @            @            @            @            @            @
5750        @            @            @            @            @            @            @            @
5760        @            @            @            @            @            @            @            @
5770        @            @            @            @            @            @            @            @
```

OCTAL LISTING OF PARAGRAPH # 014, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
6000         00006 1      22150 0      30004 0      54151 0      77641 1      54101 0      66426 1      54100 1
6010         16023 1      22006 1      16003 0      54147 1      30151 1      54004 1      10023 1      16032 1
6020         10067 1      14412 0      24150 0      50150 0      30000 1      10000 0      16342 0   C: 00177 0
6030         54023 1      76027 0      54020 1      10020 1      16167 0      16731 0      77657 0      10000 0

6040         16073 1      50150 0      40001 1      10000 0      16135 1   C: 77773 1      24150 0      54102 0
6050         66171 0      10000 0      66234 1      16060 0      30104 1      26102 0      50020 0      76234 0
6060         00006 1      66056 1      60100 0      54004 1      76426 0      67645 1      54102 0      50020 0
6070         76234 0      37676 1      54020 1      30104 1      54114 1      24150 0      50150 0      40000 0

6100         10000 0      24114 0      16103 1      54102 0      76232 0      00006 1      16111 1      30101 1
6110         26102 0      50114 0      40046 1      26102 0      76231 0      00006 1      16131 0      76232 0
6120         00006 1      16133 1      30102 1      54004 1      76426 0      67645 1      54102 0      50020 0
6130         36234 1      30104 1      26102 0      50020 0      36234 1      36227 0      70020 1      66142 0

6140         10000 0      16153 1   C: 77767 1      66045 0      10000 0      50000 1      46164 0      16155 1
6150         50147 0      46162 0      16155 1      50147 0      46164 0      26152 0      54102 0      50020 0
6160         76234 0   C: 00002 0   C: 00006 1   C: 00006 1   C: 00002 0   C: 00003 1   C: 00006 1      10020 1
6170         16217 1   C: 77722 0      24150 0      50150 0      30000 1      54103 1      54102 0      76231 0

6200         10000 0      16203 1      16210 0      36230 0      54004 1      70020 1      50000 1      16275 0
6210         30104 1      26102 0      36230 0      54004 1      70020 1      50000 1      16275 0      54004 1
6220         10020 1      50000 1      16315 1      10147 1      12000 1      12000 1      12102 1   C: 00023 0
6230      C: 02177 1   C: 77700 0   C: 76000 0   C: 36000 1   C: 76056 0      16511 0      17050 1      17603 1

6240         17354 0      16672 0      16474 1      16465 1      17552 0      16505 0      16624 0      16527 0
6250         17307 0      16563 0      16632 1      17312 1      17544 1      17522 1      17525 0      17531 0
6260         17547 1      16733 1      16761 0      17011 1      17304 0      17434 1      17400 0      16777 1
6270         17035 1      16751 0      16272 1      17520 0      17541 1      12000 1      12005 1      12010 0

6300         12014 1      12020 0      12024 1      12040 0      12047 1      12032 0      12043 0      12107 1
6310         12114 0      12127 0      12067 0      12135 0      12077 1      13135 1      13456 1      13445 0
6320         13536 0      13540 1      13122 1      12077 1      17616 0      13160 1      12750 0      13124 1
6330         13174 1      16334 1      13224 1      13177 1      30151 1      54004 1      24150 0      50150 0

6340         40000 0      67667 1      54102 0      76426 0      56102 1      76233 1      00006 1      77652 0
6350         50000 1      16352 1      06422 0      16022 0      06414 0      16022 0      06417 0      16022 0
6360         06422 0      16455 1      06414 0      16455 1      06417 0      16455 1      06422 0      16071 0
6370         06414 0      16071 0      06417 0      16071 0      06422 0      16460 1      06414 0      16460 1
```

OCTAL LISTING OF PARAGRAPH # 015, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
6400        06417 0     16460 1     06422 0     16463 1     06414 0     16463 1     06417 0     16463 1
6410        06422 0     37674 0     54020 1     16172 1     50104 1     40046 1     16421 1     50104 1
6420        40047 0     26102 0     30102 1     66171 0     10000 0     16431 0  C: 01777 1     30104 1
6430        26102 0     00006 1     30141 0     50102 1     52001 1     10147 1     16451 0     00002 0

6440        00006 1     30144 0     50102 1     52003 0     00006 1     30146 1     50102 1     52005 0
6450        00002 0     30142 0     50102 1     54002 1     00002 0     37675 1     54020 1     16041 0
6460        37641 0     54020 1     16041 0     36042 1     16072 0     00006 1     50102 1     30001 0
6470        52141 1     37665 0     54142 1     16013 1     50102 1     30002 0     54142 1     00006 1

6500        50102 1     30001 0     52141 1     37657 1     16013 1     22007 0     50102 1     30000 1
6510        16470 0     00006 1     50102 1     30001 0     52141 1     00006 1     50102 1     30003 1
6520        52144 1     00006 1     50102 1     30005 1     52146 0     47657 0     16013 1     00006 1
6530        50102 1     30001 0     52141 1     50152 1     52001 1     50147 0     36164 1     26152 0

6540        10147 1     16556 0     16554 1     54147 1     54142 1     52144 1     50152 1     51775 0
6550        52146 0     50152 1     51777 1     16014 0     54142 1     16014 0     54147 1     56142 0
6560        50152 1     53777 0     16014 0     00006 1     50102 1     30001 0     52141 1     50152 1
6570        52001 1     50147 0     36164 1     26152 0     10147 1     16614 0     16515 1     00006 1

6600        50102 1     30003 1     52144 1     50152 1     51775 0     00006 1     50102 1     30005 1
6610        52146 0     50152 1     51777 1     16014 0     00006 1     50102 1     30003 1     52144 1
6620        30142 0     50152 1     53777 0     16521 0     24150 0     50150 0     30000 1     50102 1
6630        54000 0     16014 0     24150 0     50150 0     30000 1     50102 1     60000 1     54004 1

6640        76426 0     50000 1     32000 0     54103 1     46426 0     60150 0     60151 1     50104 1
6650        54052 1     30103 0     54004 1     76426 0     67645 1     54150 1     10004 1     16002 1
6660        16662 1     16002 1     40150 1     66710 1     10000 0     30104 1     26150 1     50150 0
6670        26000 0     16652 1     50150 0     30001 0     50102 1     60000 1     54004 1     76426 0

6700        50000 1     32000 0     16652 1     30151 1     54004 1     50150 0     30001 0     16652 1
6710     C: 02055 0     10140 0     00002 0     16715 0     16727 1     10141 1     00002 0     16721 1
6720        16727 1     10142 1     00002 0     16725 0     16727 1     50002 0     00001 0     50002 0
6730        00002 0     50150 0     10001 1     00006 1     50102 1     30003 1     20144 1     00006 1

6740        16742 1     07007 1     00006 1     50102 1     30005 1     20146 0     00006 1     16751 0
6750        07007 1     00006 1     50102 1     30001 0     20141 1     00006 1     16014 0     07007 1
6760        16014 0     00006 1     50102 1     40003 0     20144 1     00006 1     16770 0     07007 1
6770        00005 1     50102 1     40005 0     20146 0     00006 1     16777 1     07007 1     00006 1
```

OCTAL LISTING OF PARAGRAPH # 016, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
7000     50102 1    40001 1    20141 1    00006 1    16014 0    07007 1    16014 0    37657 1
7010     17132 1    00006 1    50102 1    30003 1    52144 1    00006 1    40001 1    20144 1
7020     00006 1    17023 0    07007 1    00006 1    50102 1    30005 1    52146 0    00006 1
7030     40001 1    20146 0    00006 1    17035 1    07007 1    00006 1    50102 1    30001 0

7040     52141 1    00006 1    40001 1    20141 1    00006 1    16014 0    07007 1    16014 0
7050     00006 1    50102 1    30002 0    20142 1    50102 1    60000 1    60140 1    54140 0
7060     16014 0    54105 1    16014 0    50002 0    30000 1    24002 0    54102 0    50102 1
7070     30001 0    54142 1    37665 0    56141 0    54121 1    00006 1    70142 1    56142 0

7100     00006 1    70140 0    20142 1    50102 1    30000 1    56121 0    00006 1    70121 1
7110     20142 1    56140 1    00006 1    70121 1    20141 1    00002 0    37665 0    54147 1
7120     56142 0    60000 1    54001 1    00002 0    60141 0    54141 1    00002 0    60140 1
7130     54140 0    00002 0    54105 1    00002 0    37656 0    54122 1    00006 1    22123 1

7140     07067 1    52144 1    52141 1    52115 0    30142 0    54116 0    30122 0    26102 0
7150     07067 1    52142 1    20116 0    60140 1    60114 0    54114 1    17160 0    54105 1
7160     52146 0    52141 1    30122 0    26102 0    07067 1    52116 0    20142 1    60140 1
7170     60114 0    54140 0    00123 1    54105 1    00123 1    00006 1    22125 1    54103 1

7200     22124 0    17212 0    50002 0    30000 1    54124 1    60000 1    60002 0    54103 1
7210     67664 1    54125 0    37677 0    54102 0    00006 1    50103 0    30004 0    52141 1
7220     52107 0    17225 1    54124 1    47656 1    26103 1    07067 1    00006 1    50103 0
7230     30002 0    20141 1    10124 1    17222 0    00125 1    00006 1    22114 0    06711 0

7240     17244 0    17264 1    47637 0    17245 1    37637 1    54115 0    00006 1    24000 1
7250     60142 0    54142 1    37665 0    60115 1    60141 0    54141 1    37665 0    60115 1
7260     60140 1    54140 0    54141 1    00114 0    54142 1    17261 1    54121 1    00006 1
7270     70142 1    54142 1    37665 0    56141 0    00006 1    70121 1    20142 1    56140 1

7300     00006 1    70121 1    20141 1    00002 0    07134 0    37665 0    16013 1    37656 0
7310     54124 1    17315 0    47661 0    54124 1    36162 1    54122 1    07506 0    07136 1
7320     00006 1    30107 1    52141 1    52120 0    00006 1    30111 0    52144 1    00006 1
7330     30113 1    52146 0    30124 0    26102 0    07136 1    52107 0    52141 1    52111 1

7340     52144 1    52113 0    52146 0    30124 0    26102 0    07136 1    52120 0    52141 1
7350     52146 0    52111 1    52144 1    16014 0    10147 1    17403 0    17403 0    07067 1
7360     07120 0    52144 1    52141 1    52144 1    07067 1    07120 0    52146 0    52141 1
7370     52146 0    07067 1    07120 0    52141 1    52146 0    52144 1    52141 1    16014 0
```

```
OCTAL LISTING OF PARAGRAPH # 017, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

  7400      07134 0      47655 1      26102 0      00006 1      30141 0      52144 1      07067 1      07120 0
  7410      37656 0      26102 0      00006 1      30144 0      52141 1      52146 0      07067 1      07120 0
  7420      37656 0      26102 0      52144 1      52141 1      52144 1      07067 1      07120 0      52141 1
  7430      52146 0      52141 1      47657 0      16013 1      00006 1      30146 1      52141 1      52107 0

  7440      07067 1      00006 1      40144 1      52141 1      52111 1      07067 1      37656 0      26102 0
  7450      00006 1      40146 0      52141 1      52146 0      07067 1      00006 1      30107 1      52141 1
  7460      52113 0      07067 1      37656 0      26102 0      00006 1      40107 0      52141 1      20146 0
  7470      00006 1      17473 1      07007 1      07067 1      52111 1      52144 1      52141 1      20144 1

  7500      00006 1      17503 1      07007 1      07067 1      52113 0      16754 0      00006 1      30141 0
  7510      52107 0      00006 1      30144 0      52111 1      00006 1      30146 1      52113 0      00002 0
  7520      07067 1      16014 0      07067 1      07117 1      16014 0      00006 1      50102 1      30001 0
  7530      17535 1      00006 1      50102 1      30001 0      52141 1      52115 0      37665 0      54004 1

  7540      12332 0      30102 1      54152 0      16016 1      37665 0      54004 1      12153 0      36027 1
  7550      54004 1      12174 0      10147 1      17564 0      17564 0      00006 1      50102 1      30001 0
  7560      52115 0      37665 0      54004 1      12576 0      00006 1      50102 1      30003 1      52144 1
  7570      00006 1      50102 1      30005 1      52146 0      47657 0      54147 1      00006 1      50102 1

  7600      30001 0      52141 1      17560 1      50102 1      10000 0      16016 1      17610 0      17616 0
  7610      50102 1      10001 1      16016 1      16016 1      17616 0      16016 1      00006 1      40141 1
  7620      52141 1      10147 1      17633 1      17633 1      00006 1      40144 1      52144 1      00006 1
  7630      40146 0      52146 0      16014 0      40142 1      54142 1      16014 0   C: 37777 1   C: 37777 1

  7640   C: 57777 1   C: 40000 0   C: 20000 0   C: 10000 0   C: 04000 0   C: 02000 0   C: 01000 0   C: 00400 0
  7650   C: 00200 0   C: 00100 0   C: 00040 0   C: 00020 0   C: 00010 0   C: 00004 0   C: 00002 0   C: 00001 0
  7660   C: 00013 0   C: 00012 1   C: 00011 1   C: 00007 0   C: 00005 1   C: 00000 1   C: 77777 0   C: 77776 1
  7670   C: 77775 1   C: 77774 0   C: 00777 0   C: 00017 1   C: 00030 1   C: 40014 0   C: 40015 1   C: 00106 0

  7700   C: 30000 1      07701 0      07702 0 CKSM 65230 0        @            @            @            @
  7710        @            @            @            @            @            @            @            @
  7720        @            @            @            @            @            @            @            @
  7730        @            @            @            @            @            @            @            @

  7740        @            @            @            @            @            @            @            @
  7750        @            @            @            @            @            @            @            @
  7760        @            @            @            @            @            @            @            @
  7770        @            @            @            @            @            @            @            @
```

OCTAL LISTING OF PARAGRAPH # 020, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
00,2000       36162 1     70020 1     54021 0     10020 1     12062 0  C: 00024 1     50021 1     37642 0
00,2010       54121 1     10020 1     02031 1     16013 1     30121 0     00006 1     70142 1     54142 1
00,2020       30121 0     00006 1     70140 0     52141 1     30121 0     00006 1     70001 1     20142 1
00,2030       16014 0     30142 0     00006 1     70121 1     56141 0     00006 1     70121 1     56141 0

00,2040       60001 0     60000 1     54142 1     12045 0     26141 1     37665 0     54142 1     56140 1
00,2050       00006 1     70121 1     20141 1     00002 0     30121 0     00006 1     70141 1     54141 1
00,2060       56001 0     12041 1     30021 1     54121 1     00006 1     30142 0     20142 1     60140 1
00,2070       60140 1     54140 0     12074 1     54105 1     10121 1     12063 1     10020 1     07116 0

00,2100       16014 0     16014 0     37663 0     70020 1     54121 1     10020 1     12126 1  C: 00176 1
00,2110       50121 0     37642 0     54121 1     02054 1     52141 1     52144 1     52141 1     02054 1
00,2120       52141 1     52146 0     52141 1     02054 1     17373 0     54121 1     00006 1     30141 0
00,2130       20141 1     00006 1     12134 1     07007 1     00006 1     30144 0     20144 1     00006 1

00,2140       12142 0     07007 1     00006 1     30146 1     20146 0     00006 1     12150 0     07007 1
00,2150       10121 1     12125 1     16014 0     54121 1     06711 0     12157 1     12172 0     30140 1
00,2160       12167 1     24121 0     00006 1     30142 0     20142 1     60140 1     26140 0     60000 1
00,2170       54000 0     12161 1     40121 1     16627 0     70102 0     10000 0     12204 1     37646 1

00,2200       70102 0     10000 0     07116 0     16014 0     54121 1     37650 0     00006 1     70102 0
00,2210       76165 1     50000 1     12213 1     12312 1     12321 1     12316 0     10147 1     12257 1
00,2220       12257 1     30121 0     62273 0     00006 1     62110 0     67667 1     54121 1     37665 0
00,2230       54001 1     56140 1     56141 0     02252 0     20141 1     56143 1     56144 0     02252 0

00,2240       20144 1     56145 1     56146 1     02252 0     20146 0     10121 1     12222 0     13630 0
00,2250    C: 04604 1     16014 0     60000 1     54142 1     37665 0     56001 0     00002 0     30121 0
00,2260       62273 0     00006 1     62302 1     67667 1     54121 1     37665 0     56140 1     56141 0
00,2270       54142 1     10121 1     02260 1  C: 77763 0  C: 22650 1     37646 1     70102 0     10000 0

00,2300       07116 0     16014 0     50121 0     37642 0     54121 1     37646 1     70102 0     10000 0
00,2310       12012 1     12014 1     40121 1     62107 0     54121 1     12216 1     40121 1     62107 0
00,2320       54121 1     10147 1     12325 0     12325 0     12126 1     37652 1     00006 1     70102 0
00,2330       54020 1     12064 0     47657 0     54122 1     54123 0     54124 1     10114 1     12366 1

00,2340       12342 1     12362 0     56115 1     56114 0     56141 0     56140 1     00006 1     12351 0
00,2350       12355 1     10114 1     12366 1     12355 1     12362 0     37637 1     54140 0     02552 1
00,2360       37657 1     17061 0     00006 1     40115 0     52115 0     24122 0     10140 0     12403 0
00,2370       12372 1     12377 1     10141 1     12403 0     16014 0     12377 1     16014 0     00006 1
```

OCTAL LISTING OF PARAGRAPH # 021, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
00,2400        40141 1    52141 1    24122 0    40140 0       67667 1    60114 0    10000 0    12451 1
00,2410     C: 60001 0    12412 0    37642 0    60000 1       60141 0    54141 1    37665 0    67637 1
00,2420        26140 0    37642 0    60000 1    60115 1       54115 0    37665 0    67637 1    26114 1
00,2430        40140 0    60114 0    10000 0    12451 1    C: 00117 0    12355 1    54124 1    40141 1

00,2440        60115 1    00006 1    62355 0    12451 1       00006 1    24123 1    00006 1    30115 1
00,2450        20115 0    30114 0    60000 1    54000 0       12444 0    52141 1    50123 1    02507 1
00,2460        54142 1    16014 0    22021 1    00006 1       77642 1    56001 0    60021 1    56001 0
00,2470        12513 0    20001 1    20001 1    20001 1       20001 1    20001 1    20001 1    20001 1

00,2500        20001 1    20001 1    20001 1    20001 1       20001 1    20001 1    52141 1    10124 1
00,2510     C: 06552 0    12564 0    52141 1    00006 1       10114 1    52141 1    40140 0    00006 1
00,2520        70115 0    60141 0    54000 0    12530 1       00006 1    60114 0    24140 1    12532 0
00,2530        00006 1    62542 0    00006 1    60114 0       00006 1    12540 0    00006 1    62546 1

00,2540        24140 1    12547 1    00006 1    12552 0       00006 1    26140 0    60114 0    22007 0
00,2550        00006 1    10114 1    54141 1    10122 1       00002 0    00002 0    00002 0    00006 1
00,2560        40141 1    52141 1    37665 0    00002 0       40140 0    60114 0    00006 1    12571 1
00,2570        12512 1    37637 1    54140 0    40115 0       60141 0    12546 0    47657 0    54123 0

00,2600        54113 0    10114 1    12637 0    12605 1       12633 1    56115 1    56114 0    56141 0
00,2610        56140 1    00006 1    12614 1    12355 1       56144 0    56143 1    00006 1    12621 1
00,2620        12355 1    56146 1    56145 1    00006 1       12626 0    12355 1    10114 1    12637 0
00,2630        12355 1    12633 1    12355 1    00006 1       40115 0    52115 0    24113 1    37642 0

00,2640        60000 1    60115 1    54115 0    37665 0       67637 1    26114 1    56117 0    30115 1
00,2650        54120 0    12657 0    00006 1    24123 1       00006 1    30115 1    20115 0    30114 0
00,2660        60000 1    54000 0    12652 0    02675 1       52144 1    52141 1    52144 1    02675 1
00,2670        52146 0    52141 1    52146 0    02675 1       17373 0    30113 1    54122 1    10140 0

00,2700        12714 0    12703 0    12710 1    10141 1       12714 0    00002 0    12710 1    00002 0
00,2710        00006 1    40141 1    52141 1    24122 0       47657 0    54124 1    40140 0    60117 0
00,2720        00006 1    62725 0    52141 1    50123 1       12507 0    37642 0    60000 1    60141 0
00,2730        54141 1    37665 0    67637 1    26140 0       40140 0    60117 0    10000 0    12722 0

00,2740     C: 32506 0    12355 1    54124 1    40141 1       60120 1    00006 1    62355 0    12722 0
00,2750        07506 0    37665 0    56105 0    54125 0       03246 1    30125 1    56105 0    00006 1
00,2760        12762 1    12355 1    00006 1    30141 0       50104 1    52043 1    03272 0    10140 0
00,2770        12775 1    54001 1    50104 1    52045 1       12355 1    43076 1    60121 0    10000 0
```

```
OCTAL LISTING OF PARAGRAPH # 022, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,3000      40000 0     13057 1     13011 0     43075 1     54121 1     30140 1     54001 1     37665 0
00,3010      13036 0     10121 1     13020 1     42005 1     54121 1     00006 1     30141 0     13036 0
00,3020      40000 0     54121 1     40000 0     50000 1     37642 0     54114 1     00006 1     70141 1
00,3030      56114 0     00006 1     70140 0     56001 0     60114 0     56001 0     50104 1     52045 1

00,3040      47657 0     54124 1     52107 0     52141 1     52115 0     03077 1     52111 1     52141 1
00,3050      52144 1     03077 1     52113 0     52141 1     52146 0     03077 1     17373 0     54121 1
00,3060      37665 0     56107 1     56106 0     56111 0     56110 1     56113 1     56112 0     40121 1
00,3070      50000 1     37642 0     00006 1     70140 0     13006 0  C; 00015 0  C; 00016 0     10140 0

00,3100      13116 0     13103 1     13110 0     10141 1     13116 0     00002 0     13110 0     00002 0
00,3110      47665 1     54122 1     00006 1     40141 1     50121 0     12506 1     54122 1     52141 1
00,3120      50121 0     12506 1     03227 0     16014 0     10147 1     13154 0     13154 0     03246 1
00,3130      22147 0     00006 1     30141 0     50104 1     52043 1     03272 0     10121 1     13141 1

00,3140      16014 0     62273 0     00006 1     63147 0     22007 0     22102 1     12263 0     50121 0
00,3150      37641 0     54121 1     37665 0     12017 1     06711 0     16014 0     16014 0     17616 0
00,3160      47655 1     26152 0     00006 1     50000 1     30003 1     52144 1     00006 1     50152 1
00,3170      30001 0     52146 0     47657 0     16013 1     03246 1     37665 0     16013 1     00006 1

00,3200      30141 0     50152 1     52001 1     50147 0     36164 1     26152 0     10147 1     13222 1
00,3210      16014 0     00006 1     30144 0     50152 1     51775 0     00006 1     30146 1     50152 1
00,3220      51777 1     16014 0     30142 0     16560 0     50104 1     30052 0     16652 1     30141 0
00,3230      00006 1     70000 0     54142 1     37665 0     56141 0     00006 1     70140 0     20001 1

00,3240      20142 1     56140 1     00006 1     70000 0     20141 1     00002 0     00006 1     22123 1
00,3250      03227 0     52144 1     52141 1     52115 0     30142 0     54116 0     03227 0     52142 1
00,3260      20116 0     60140 1     60114 0     54114 1     13266 1     54105 1     52146 0     52141 1
00,3270      03227 0     17165 0     37665 0     54121 1     10140 0     13333 0     13300 0     13322 0

00,3300      56142 0     56141 0     54140 0     37663 0     54121 1     10140 0     13333 0     13311 0
00,3310      13325 1     56141 0     54140 0     37663 0     26121 1     10140 0     13333 0     00002 0
00,3320      13325 1     00002 0     10000 0     13331 1     10141 1     37665 0     13401 0     13331 1
00,3330      13401 0     05446 1  C; 01302 1     62410 0     00006 1     63404 1     52141 1     22021 1

00,3340      00006 1     77642 1     52141 1     56021 1     26141 1     32274 1     00006 1     70140 0
00,3350      62510 1     54114 1     30140 1     22007 0     00006 1     10114 1     00006 1     77642 1
00,3360      26114 1     00006 1     77642 1     52141 1     00006 1     10114 1     54115 0     37665 0
00,3370      56001 0     00006 1     10114 1     54001 1     30115 1     20141 1     00006 1     13403 1
```

```
OCTAL LISTING OF PARAGRAPH # 023, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,3400      37637 1      54140 0      54141 1      00002 0      67643 1      00006 1      63430 0      52141 1
00,3410      22021 1      00006 1      77642 1      52141 1      56021 1      26141 1      32740 0      00006 1
00,3420      70140 0      62250 1      13351 1      00006 1      30142 0      20142 1      60140 1      26140 0
00,3430      24121 0      00006 1      30142 0      20142 1      60140 1      26140 0      60000 1      54022 0

00,3440      10022 0      10022 0      13423 0      13345 1      13416 0      06711 0      13451 0      13454 0
00,3450      13454 0      00006 1      40141 1      52141 1      37643 1      26140 0      52141 1      20001 1
00,3460      54000 0      13464 0      00006 1      40001 1      52141 1      30140 1      60000 1      54001 1
00,3470      13501 1      50000 1      37641 0      60000 1      00006 1      60140 1      54140 0      40141 1

00,3500      54141 1      00006 1      30141 0      52120 0      03227 0      07202 0   C: 00003 1   C: 14441 0
00,3510   C: 37325 1   C: 53250 0   C: 60764 1   C: 12146 1   C: 21276 1   C: 75466 1   C: 71471 0   C: 00236 0
00,3520   C: 32757 0      32434 0      07066 0      00006 1      30142 0      20142 1      60140 1      26140 0
00,3530      00006 1      30142 0      20142 1      60140 1      26140 0      16014 0      33557 0      13541 0

00,3540      33641 1      54122 1      06711 0      13553 0      13655 0      00006 1      40141 1      52141 1
00,3550      32247 1      56122 0      54123 0      47642 1      60140 1      10000 0      13647 0      13635 0
00,3560      13570 1      10141 1      37665 0      13565 0      13570 1      54141 1      54140 0      00122 0
00,3570      00006 1      40141 1      67642 0      52141 1      52120 0      03272 0      10121 1      13642 0

00,3600      52141 1      52120 0      52141 1      07202 0   C: 00006 1   C: 13240 0   C: 23630 0   C: 74721 0
00,3610   C: 47775 1   C: 02440 0   C: 20237 0   C: 75067 1   C: 70742 1   C: 03436 0   C: 26756 1   C: 74037 0
00,3620   C: 57640 1   C: 03046 0   C: 07143 0   C: 76654 1   C: 42244 0      32434 0      07066 0      00122 0
00,3630      00006 1      40141 1      67642 0      52141 1      00123 1      00006 1      40141 1      67643 1

00,3640      52141 1      16014 0      50000 1      37642 0      54121 1      02054 1      13600 0      10000 0
00,3650      13652 1      13565 0      13565 0      05446 1   C: 01301 1      37643 1      13566 0      03657 0
00,3660      03660 1   CKSM 72412 0      @            @            @            @            @            @
00,3670      @            @            @            @            @            @            @            @

00,3700      @            @            @            @            @            @            @            @
00,3710      @            @            @            @            @            @            @            @
00,3720      @            @            @            @            @            @            @            @
00,3730      @            @            @            @            @            @            @            @

00,3740      @            @            @            @            @            @            @            @
00,3750      @            @            @            @            @            @            @            @
00,3760      @            @            @            @            @            @            @            @
00,3770      @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 024, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,2000        02061 1      30103 0      50114 0      54046 1      16014 0      02061 1      40103 1      02002 1
01,2010        02061 1      50102 1      30000 1      12002 0      02061 1      50102 1      40000 0      12002 0
01,2020        02061 1      50114 0      30046 0      16627 0      02061 1      50102 1      30000 1      50114 0
01,2030        56046 0      16627 0      02061 1      50102 1      30000 1      50114 0      26046 1      16014 0

01,2040        02061 1      30103 0      12035 1      02061 1      50102 1      40000 0      12035 1      02061 1
01,2050        50114 0      40050 0      50114 0      60046 0      00006 1      66014 1      50114 0      56046 0
01,2060        16651 1      30104 1      54114 1      10020 1      24114 0      00002 0      00002 0      10020 1
01,2070        30103 0      14105 0      10140 0      16014 0      16651 1      16014 0      16651 1      10105 1

01,2100        12102 1      16014 0      54105 1      10020 1      12070 0   C: 00360 1      16651 1      10020 1
01,2110        06711 0      16014 0      16651 1      16014 0      10020 1      12123 1   C: 12000 1      06711 0
01,2120        16014 0      16014 0      16651 1      06711 0      16651 1      16651 1      16014 0      10020 1
01,2130        16644 0      05464 1      50104 1      30052 0      16627 0      37673 1      70103 1      50000 1

01,2140        37641 0      54115 0      37651 1      00006 1      70103 1      54114 1      00004 0      50000 1
01,2150        30061 0      54002 1      37645 1      00006 1      70103 1      72215 1      50000 1      12160 0
01,2160        30115 1      00006 1      04002 1      12172 0      30115 1      00006 1      06002 0      12172 0
01,2170        40115 0      70002 1      50114 0      54061 1      00003 1      37643 1      00006 1      70103 1

01,2200        72215 1      50000 1      12203 0      40002 1      70115 0      10000 0      12216 1      16703 1
01,2210        12216 1      05464 1      05464 1      30002 0      12204 1   C: 00014 1      24150 0      16014 0
01,2220        54065 0      10431 0      12235 0      10505 0      12235 0      10561 1      12235 0      10635 0
01,2230        12235 0      10711 1      12235 0      05446 1   C: 01201 0      67656 0      22007 0      50000 1

01,2240        21777 0      26070 1      37665 0      54071 0      32251 0      54066 0      50071 1      10153 1
01,2250        12311 1   C: 00006 1      12311 1      30070 0      50071 1      54153 1      77672 1      50071 1
01,2260        54152 0      10071 0      12276 1      54105 1      30152 1      54104 0      10067 1      12276 1
01,2270        05464 1      05464 1      54067 1      52073 1      52151 0      14443 1      52073 1      50071 1

01,2300        52151 0      50067 0      40153 1      60070 0      00006 1      64443 0      30071 1      54067 1
01,2310        14443 1      32424 1      26071 0      10066 0      12245 1      05446 1   C: 01202 0      52151 0
01,2320        50067 0      52151 0      52151 0      52141 1      50067 0      52141 1      52141 1      52143 0
01,2330        50067 0      52143 0      52143 0      52145 0      50067 0      52145 0      52145 0      52147 1

01,2340        50067 0      52147 1      52147 1      37665 0      56105 0      00006 1      12351 0      40152 0
01,2350        54152 0      52153 1      50067 0      52153 1      52153 1      37672 0      70153 1      54104 0
01,2360        10152 0      37665 0      12367 0      40152 0      54152 0      37657 1      56105 0      54067 1
01,2370        00003 1      52151 0      00006 1      62375 1      52006 0      40000 0      67657 1      54150 1
```

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OCTAL LISTING OF PARAGRAPH # 025, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,2400       36232 1      70001 1      16011 0      00004 0      40153 1      54153 1      36027 1      70006 0
01,2410       54151 0      47665 1      54115 0      12504 0      54065 0      37665 0      54071 0      32251 0
01,2420       54066 0      50071 1      10153 1      12426 1   C: 00014 1      12435 0      32424 1      26071 0
01,2430       10066 0      12420 1      47657 0      54071 0      14443 1      40072 0      50071 1      60150 0

01,2440       00006 1      12443 1      12426 1      50071 1      40153 1      54070 1      50071 1      54153 1
01,2450       46232 0      70072 0      67645 1      56072 1      76232 0      50071 1      60151 1      54073 1
01,2460       10071 0      12276 1      12266 0      54150 1      37665 0      54114 1      37672 0      70153 1
01,2470       60070 0      54153 1      40000 0      12412 0      00004 0      47665 1      54115 0      56153 0

01,2500       77672 1      10000 0      50000 1      54000 0      10167 0      02551 1      05464 1      12510 0
01,2510       10203 1      02551 1      05464 1      12514 1      10217 1      02551 1   C: 67624 0      12520 0
01,2520       10233 1      02551 1      05464 1      12524 1      10247 1      02551 1      05464 1      12530 1
01,2530       10263 1      02551 1      05464 1      12534 0      10115 0      05464 1      05464 1      12541 1

01,2540       14450 0      10114 1      12544 1      12370 0      50000 1      27777 0      62516 1      54067 1
01,2550       12317 1      54116 0      60115 1      10000 0      40116 0      12561 0      12557 0      50002 0
01,2560       00002 0      54115 0      00006 1      22114 0      50114 0      00002 0      54066 0      40026 1
01,2570       62571 0      10000 0      66042 1      40000 0      62722 1      60002 0      10000 0      61400 1

01,2600       12642 1      12602 0      40002 1      67642 0      67642 0      56026 0      67641 0      60002 0
01,2610       00006 1      22007 0      57400 1      57401 0      57402 0      57403 1      57404 0      57405 1
01,2620       57406 1      57407 0      30070 0      50002 0      12625 0      53411 0      53413 1      53415 1
01,2630       53417 0      53421 0      53423 1      53425 1      53427 0      53431 1      64567 1      00006 1

01,2640       14547 1      12715 1      10000 0      61401 0      12650 1      67657 1      02723 0   C: 00001 0
01,2650       10000 0      61402 0      12656 1      67657 1      02723 0   C: 00002 0      10000 0      61403 1
01,2660       12664 0      67657 1      02723 0   C: 00003 1      10000 0      61404 0      12672 1      67657 1
01,2670       02723 0   C: 00004 0      10000 0      61405 1      12700 0      67657 1      02723 0   C: 00005 1

01,2700       10000 0      61406 1      12706 0      67657 1      02723 0   C: 00006 1      10000 0      61407 0
01,2710       12714 0      67657 1      02723 0   C: 00007 0      10000 0      05446 1   C: 01203 1      67657 1
01,2720       02723 0   C: 00010 0   C: 50001 0      54071 0      50002 0      30000 1      54002 1      37657 1
01,2730       60071 1      50002 0      27377 1      40071 0      50002 0      12612 1      54016 1      00006 1

01,2740       22012 1      37640 1      57407 0      57406 1      57405 1      57404 0      57403 1      57402 0
01,2750       57401 0      57400 1      67637 1      26026 1      55070 0      47665 1      55070 0      00006 1
01,2760       44570 0      53431 1      53427 0      53425 1      53423 1      53421 0      53417 0      53415 1
01,2770       53413 1      53411 0      52006 0      05317 1      32777 1      05332 0      04437 0   C: 00531 0
```

```
OCTAL LISTING OF PARAGRAPH # 026, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,3000        55371 1      40000 0      67656 0      00006 1      63013 0      37665 0      55361 0      31371 0
01,3010        50000 1      03011 1      03034 0      37665 0      55361 0      04102 0   C: 40047 0   C: 05265 0
01,3020     C: 04143 0   C: 05471 0   C: 05573 0   C: 04757 0   C: 05736 0   C: 05634 0   C: 05163 0   C: 05675 0
01,3030     C: 05777 0   C: 07265 1   C: 00013 0   C: 00042 1      37661 1      55373 0      00004 0      37657 1

01,3040        04536 0   C: 03075 0   C: 02003 0      00003 1      03015 0      55373 0      00004 0      51373 1
01,3050        43017 0      54307 1      54310 1      54311 0      54312 0      54313 1      54314 0      54315 1
01,3060        54316 1      54317 0      54320 1      54321 0      33032 0      54303 0      00004 0      37646 1
01,3070        04536 0   C: 03075 0   C: 02003 0      00003 1      04602 1      11373 0      03045 0      03104 1

01,3100        03121 0      11372 1      03135 0      03141 0      47657 0      55373 0      33033 1      00006 1
01,3110        05011 1      43031 1      00004 0      54307 1      54312 0      54314 0      36165 0      54303 0
01,3120        03066 1      47665 1      55373 0      37657 1      55372 1      00004 0      43031 1      54310 1
01,3130        54313 1      54315 1      36165 0      54303 0      03066 1      55372 1      47644 1      00004 0

01,3140        03051 0      43033 0      00006 1      03011 1      04602 1      03145 1      03146 1 CKSM 65636 1
01,3150        @            @            @            @            @            @            @            @
01,3160        @            @            @            @            @            @            @            @
01,3170        @            @            @            @            @            @            @            @

01,3200        @            @            @            @            @            @            @            @
01,3210        @            @            @            @            @            @            @            @
01,3220        @            @            @            @            @            @            @            @
01,3230        @            @            @            @            @            @            @            @

01,3240        @            @            @            @            @            @            @            @
01,3250        @            @            @            @            @            @            @            @
01,3260        @            @            @            @            @            @            @            @
01,3270        @            @            @            @            @            @            @            @

01,3300        @            @            @            @            @            @            @            @
01,3310        @            @            @            @            @            @            @            @
01,3320        @            @            @            @            @            @            @            @
01,3330        @            @            @            @            @            @            @            @

01,3340        @            @            @            @            @            @            @            @
01,3350        @            @            @            @            @            @            @            @
01,3360        @            @            @            @            @            @            @            @
01,3370        @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 040, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

04,2000      03454 1      03476 1      37657 1      56277 0      54101 0      56140 1      54103 1      50000 1
04,2010      02011 0      03275 1      02062 1      02062 1      02062 1      02062 1      02062 1      02062 1
04,2020      02062 1      02053 0      02053 0      03275 1      03275 1      03275 1      03275 1      03275 1
04,2030      03275 1      02060 0      02235 1      02343 1      03275 1      03275 1      03275 1      03275 1

04,2040      03275 1      03275 1      03320 0      02267 0      02254 0      02051 1      03275 1      02431 0
04,2050      02250 1      04102 0   C: 12003 1      36165 0      70265 1      10000 0      02062 1      03275 1
04,2060      37665 0      54103 1      10264 0      02067 1      02067 1      02066 0      04440 0      02205 1
04,2070      10302 1      37665 0      54302 1      02074 0      50103 0      34741 1      75224 1      54110 0

04,2100      30264 1      54127 1      03201 1      36165 0      70265 1      10000 0      02117 1      50123 1
04,2110      56266 0      54022 0      40022 0      40022 0      56022 1      60103 0      02134 0      50123 1
04,2120      56266 0      54140 0      37665 0      54141 1      37661 1      07266 1      56141 0      60103 0
04,2130      54141 1      02134 0      26140 0      02152 0      50123 1      54266 1      40264 0      50123 1

04,2140      62176 0      00006 1      12144 0      02173 0      36165 0      70265 1      10000 0      02152 0
04,2150      40264 0      02174 1      07063 0   C; 02203 1      36165 0      70265 1      50000 1      02157 0
04,2160      02164 0      00006 1      40142 1      52142 1      56142 0      50123 1      54271 1      56141 0
04,2170      50123 1      54266 1      02150 1      10264 0      54264 0      04440 0   C: 00022 1   C; 00020 0

04,2200   C: 00012 1   C: 00005 1   C: 00000 1   C: 05174 0   C: 13261 0      50264 1      32211 1      54123 0
04,2210      00002 0   C: 00004 0   C: 00004 0   C: 00004 0   C: 00004 0   C: 00004 0   C: 00003 1   C: 00003 1
04,2220   C; 00003 1   C: 00003 1   C: 00003 1   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0   C: 00002 0
04,2230      05464 1   C: 00001 0   C; 00001 0   C: 00000 1   C: 00000 1      37665 0      54266 1      35237 1

04,2240      54264 0      02541 0      37665 0      54265 1      54300 0      35150 0      54122 1      04440 0
04,2250      37665 0      54267 0      35240 1      02240 0      02326 1      02313 1      37656 0      50123 1
04,2260      67651 1      26265 1      10302 1      37665 0      54302 1      02266 1      04440 0      02326 1
04,2270      02273 0      37657 1      02257 0      22002 0      02205 1      50123 1      32321 0      54107 0

04,2300      67657 1      54106 1      37665 0      54110 0      56107 1      03263 0      37645 1      54110 0
04,2310      56106 0      03263 0      00001 0      22002 0      02205 1      50123 1      32321 0      54106 1
04,2320      67657 1      54107 0      02302 1   C; 00005 1   C; 00003 1   C: 00000 1      22002 0      45175 0
04,2330      02336 0      45176 0      02336 0      45177 1      02336 0      04440 0      60264 1      00006 1

04,2340      12342 1      00002 0      00001 0      56101 1      54277 1      00004 0      37646 1      00006 1
04,2350      05011 1      37652 1      70322 0      67641 0      54322 0      44515 0      70370 1      64515 1
04,2360      54370 1      47646 0      70367 1      67646 1      54367 1      42427 0      70413 0      67651 1
04,2370      54413 0      47646 0      00006 1      03013 0      42426 1      00006 1      03011 1      35242 0
```

OCTAL LISTING OF PARAGRAPH # 041, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
04,2400        54103 1      00004 0      50103 0      10307 1      67657 1      02412 1      67657 1      40000 0
04,2410        72430 0      02415 0      40000 0      72430 0      40000 0      50103 0      54307 1      00003 1
04,2420        10103 1      02400 1      37665 0      55363 1      55364 0      04440 0   C: 00104 1   C: 00330 1
04,2430     C: 73777 1      10264 0      67657 1      02435 1      67657 1      54264 0      02205 1      10302 1

04,2440        02446 0      02443 0      02443 0      30123 1      02470 0      02463 1      10123 0      54123 0
04,2450        02470 0      32537 1      26300 0      30123 1      54111 1      00006 1      26266 1      04063 0
04,2460     C: 12315 0      30111 0      54123 0      02466 1      24302 0      04440 0      22002 0      02500 0
04,2470        67670 1      10000 0      00002 0      05464 1      04440 0      00002 0      22002 0      02205 1

04,2500        37665 0      50123 1      54266 1      50123 1      54271 1      54110 0      50123 1      47651 0
04,2510        70265 1      72540 0      54265 1      50123 1      32530 0      54127 1      03201 1      50123 1
04,2520        32533 0      54264 0      02541 0      47656 1      26264 0      02541 0      50123 1      35173 1
04,2530        54264 0      00001 0   C: 00016 0   C: 00005 1   C: 00004 0   C: 00015 0   C: 00011 1   C: 00003 1

04,2540     C: 77774 0      30264 1      54021 0      42554 0      00004 0      50021 1      56307 0      00006 1
04,2550        62552 1      24303 1      00003 1      00002 0   C: 04000 0      37665 0      54142 1      02614 0
04,2560        02562 1      02607 1      02625 1      10140 0      56140 1      02570 1      02577 0      67667 1
04,2570        62641 0      54140 0      02575 1      37641 0      26140 0      37656 0      02556 0      56140 1

04,2600        62641 0      10000 0      02571 0      05464 1      67657 1      40000 0      02571 0      00006 1
04,2610        50142 0      32636 0      52110 0      00002 0      10140 0      00002 0      00002 0      12620 0
04,2620        47641 1      70140 0      54140 0      50002 0      00001 0      00006 1      50142 0      32636 0
04,2630        52141 1      07266 1      52110 0      20141 1      02645 1   C: 05605 1   C: 03656 1   C: 16314 0

04,2640     C: 31463 1   C: 16040 1      52110 0      52141 1      07266 1      04102 0   C: 12513 0      02661 1
04,2650        56142 0      56141 0      54140 0      02645 1      02661 1      02645 1      02661 1      03054 0
04,2660        02645 1      56002 0      54105 1      50124 0      02664 1      02702 0      50103 0      30134 1
04,2670        75234 0      05171 0      00006 1      50000 1      30001 0      52141 1      07235 1      07063 0

04,2700     C: 00107 1      00105 0      30131 1      02672 0      50124 0      02705 1      02710 0      03277 0
04,2710        00006 1      50131 1      30001 0      52141 1      35175 1      54264 0      37665 0      54142 1
04,2720        07235 1      03155 0      00122 0      07063 0   C: 02766 1      10141 1      37645 1      02731 0
04,2730        47645 0      60141 0      03066 1      05263 0      05263 0      03075 0      05263 0      10140 0

04,2740        02744 1      02744 1      40000 0      54140 0      10105 1      02762 0      02756 1      10140 0
04,2750        05464 1      02760 1      02753 1      56140 1      77637 0      54140 0      04102 0   C: 13040 1
04,2760        47637 0      02755 1      40140 0      77637 0      40000 0      02755 1   C: 26161 0   C: 30707 1
04,2770     C: 21616 0   C: 07071 0   C: 71527 1      07063 0   C: 00107 1      56142 0      56141 0      56140 1
```

```
OCTAL LISTING OF PARAGRAPH # 042, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

04,3000        00006 1      13003 0      03277 0      03064 0      03075 0      02756 1      10140 0      03013 0
04,3010        03013 0      03277 0      03277 0      32772 1      26140 0      07063 0   C: 02770 0      37644 0
04,3020        60141 0      03066 1      02734 0      07063 0   C: 00107 1      56142 0      60000 1      54142 1
04,3030        37665 0      60141 0      03066 1      03075 0      50124 0      03035 1      03046 0      30103 0

04,3040        60131 1      54002 1      56141 0      50002 0      54001 1      02756 1      37665 0      03040 0
04,3050        07063 0   C: 00107 1      03054 0      03025 0      56002 0      54110 0      36162 1      54107 0
04,3060        05263 0      10107 0      03057 0      00110 1      56141 0      60000 1      54141 1      00002 0
04,3070        60140 1      54140 0      00002 0      54105 1      00002 0      10105 1      03277 0      00002 0

04,3100        03277 0      56002 0      54101 0      10140 0      03113 1      03113 1      67657 1      54140 0
04,3110        02313 1      40141 1      03115 1      02273 0      56141 0      63154 1      54141 1      37665 0
04,3120        60140 1      54140 0      03126 1      37637 1      54140 0      54141 1      37655 0      54123 0
04,3130        35242 0      07266 1      50140 1      34741 1      75224 1      54110 0      37665 0      56142 0

04,3140        56141 0      54140 0      56264 1      54127 1      10000 0      54264 0      03201 1      10123 0
04,3150        03127 0      45237 0      54264 0      00101 1   C: 02476 0      56002 0      54101 0      37665 0
04,3160        54110 0      36165 0      03263 0      37655 0      03263 0      10140 0      03176 1      03176 1
04,3170        67657 1      54140 0      02313 1      40141 1      54141 1      03177 0      02273 0      35176 1

04,3200        03127 0      56002 0      54100 1      35224 0      70127 1      54021 0      56021 1      54125 0
04,3210        37657 1      70127 1      10000 0      03215 1      03225 1      56110 1      05216 1      54110 0
04,3220        37642 0      70127 1      10000 0      37656 0      67657 1      54127 1      00004 0      50125 1
04,3230        10307 1      03233 0      05464 1      67657 1      54126 0      50127 0      73257 0      00006 1

04,3240        60110 1      00006 1      13255 1      50127 0      43257 0      70126 0      60110 1      40000 0
04,3250        50125 1      56307 0      00006 1      63255 0      24303 1      00003 1      00100 0   C: 00037 0
04,3260     C: 01740 0   C: 02000 0   C: 03740 1      54125 0      37656 0      54127 1      56002 0      54100 1
04,3270        03226 1      03201 1      33274 0      04105 1   C: 13250 1      35150 0      54122 1      05243 1

04,3300        43307 1      60122 0      00006 1      13305 0      00122 0      05446 1   C: 01501 1      05127 0
04,3310        37657 1      54301 1      05341 1      05300 1      03422 0      05131 1      47657 0      03311 1
04,3320        47655 1      00006 1      03011 1      05341 1      04440 0      37664 1      54264 0      54127 1
04,3330        37657 1      70127 1      56127 0      54021 0      56021 1      50000 1      10307 1      03341 1

04,3340        05464 1      67657 1      50127 0      73257 0      50127 0      03346 0      03350 1      05200 0
04,3350        54110 0      47664 0      60264 1      10000 0      67657 1      03357 0      05464 1      54127 1
04,3360        03201 1      40264 0      65175 1      10000 0      56264 1      67657 1      03326 0      37665 0
04,3370        54264 0      63420 1      50000 1      10307 1      03376 0      05464 1      67657 1      77645 0
```

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OCTAL LISTING OF PARAGRAPH # 043, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

04,3400        54110 0       50264 1       33416 1       03263 0       40264 0       63420 1       10000 0       56264 1
04,3410        67657 1       03370 0       35175 1       54264 0       02476 0       00122 0    C: 00000 1    C; 00001 0
04,3420     C: 00003 1    C: 00004 0       10323 1       03430 0       04440 0       03430 0       54323 1       03446 1
04,3430        37665 0       56323 0       00004 0       04422 1       10301 1       03452 1       04440 0       03450 0

04,3440        37656 0       50071 1       60150 0       50071 1       54150 1       00003 1       05364 0       04440 0
04,3450        37665 0       03441 0       37657 1       03441 0       54001 1       10324 0       03461 1       30001 0
04,3460        04105 1       37656 0       54130 1       50130 0       10327 0       03467 1       03472 0       10130 1
04,3470        03462 1       03536 1       30001 0       50130 0       54327 0       04416 0       54001 1       10277 1

04,3500        03503 1       30001 0       04105 1       37656 0       54324 0       30001 0       56331 0       56330 1
04,3510        56327 1       10000 0       03536 1       03515 0       03536 1       05253 0       30001 0       04416 0
04,3520        35233 0       04363 0    C: 03525 0    C; 10000 0       04602 1       05367 0       03534 0       04422 1
04,3530        00003 1       37657 1       54324 0       04440 0       37665 0       03532 0       05446 1    C: 01206 1

04,3540        03540 0       03541 1  CKSM 65206 0         @             @             @             @             @
04,3550          @             @             @             @             @             @             @             @
04,3560          @             @             @             @             @             @             @             @
04,3570          @             @             @             @             @             @             @             @

04,3600          @             @             @             @             @             @             @             @
04,3610          @             @             @             @             @             @             @             @
04,3620          @             @             @             @             @             @             @             @
04,3630          @             @             @             @             @             @             @             @

04,3640          @             @             @             @             @             @             @             @
04,3650          @             @             @             @             @             @             @             @
04,3660          @             @             @             @             @             @             @             @
04,3670          @             @             @             @             @             @             @             @

04,3700          @             @             @             @             @             @             @             @
04,3710          @             @             @             @             @             @             @             @
04,3720          @             @             @             @             @             @             @             @
04,3730          @             @             @             @             @             @             @             @

04,3740          @             @             @             @             @             @             @             @
04,3750          @             @             @             @             @             @             @             @
04,3760          @             @             @             @             @             @             @             @
04,3770          @             @             @             @             @             @             @             @
```

```
OCTAL LISTING OF PARAGRAPH # 044, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

05,2000       03344 1     13403 1     02663 0     37665 0     54302 1     35150 0     54122 1     10300 0
05,2010       02031 1     02031 1     02013 1     36165 0     70265 1     10000 0     02020 1     02024 0
05,2020       10264 0     02324 0     02324 0     02024 0     40300 0     54300 0     05300 1     00300 1
05,2030    C: 00030 1     37665 0     54265 1     40266 1     62030 0     00006 1     62116 0     00006 1

05,2040       32076 1     52006 0     50124 0     02043 1     02046 1     02176 0     10132 0     02114 1
05,2050       02324 0     02055 0     24304 0     05167 1     02102 0     37641 0     54302 1     45150 1
05,2060       60122 0     00006 1     12064 0     02100 1     02256 1     10265 1     02324 0     56272 0
05,2070       05161 1     00006 1     32076 1     52006 0     02116 0  C: 02000 0  C: 34000 0  C: 77772 0

05,2100       30142 0     05161 1     47654 0     70266 1     62077 0     00006 1     12116 1     35177 0
05,2110       54264 0     30304 0     03222 0     02116 0     67657 1     05161 1     42131 1     60266 0
05,2120       10000 0     67657 1     02124 1     02133 1     54140 0     05341 1     56140 1     62132 0
05,2130       04105 1  C: 00040 0  C: 22000 1     50266 0     32136 1     04105 1  C: 12324 1  C: 12340 0

05,2140    C: 12345 0  C: 12352 0  C: 12333 1  C: 12326 0  C: 12445 1  C: 10704 0  C: 11277 0  C: 13077 0
05,2150    C: 13077 0  C: 13077 0  C: 13077 0  C: 13077 0  C: 13077 0  C: 13077 0  C: 12324 1  C: 12620 0
05,2160    C: 12631 0  C: 12646 0  C: 12572 1  C: 12535 1  C: 12324 1  C: 13214 1  C: 13314 0  C: 13340 1
05,2170    C: 11325 0  C: 11310 0  C: 11315 0  C: 13414 1  C: 24000 1  C: 13267 0     10132 0     02203 1

05,2200       02324 0     02203 1     02203 1     46162 0     60266 0     00006 1     62210 0     02116 0
05,2210       37656 0     54103 1     62235 1     54131 0     50103 0     30134 1     54106 1     02721 1
05,2220       02236 1     02223 0     24106 0     30106 0     75234 0     05171 0     50000 1     30000 1
05,2230       50131 1     56000 1     10103 1     02211 1     02116 0     00111 0     50000 1     12240 1

05,2240       00002 0     00002 0     00002 0     00002 0     12250 0     12250 0     00002 0     12250 0
05,2250       50002 0     00001 0     35175 1     12257 1     35176 1     12257 1     35177 0     54264 0
05,2260       40002 1     54300 0     04063 0  C: 10476 0     05274 0     45150 1     60122 0     00006 1
05,2270       12273 1     47665 1     54323 1     00122 0     54267 0     56002 0     54103 1     00006 1

05,2300       32076 1     52006 0     10132 0     67657 1     12307 0     12310 0     12310 0     05161 1
05,2310       35240 1     54264 0     30267 1     12322 1     54266 1     56002 0     54103 1     35237 1
05,2320       54264 0     30266 0     03255 0     00103 0     04102 0  C: 11277 0     47656 1     02376 1
05,2330       50131 1     40002 1     56116 1     47657 0     02376 1     50131 1     40001 1     56115 1

05,2340       02420 0     50131 1     40000 0     56114 0     02357 1     47657 0     02376 1     50131 1
05,2350       40001 1     02343 1     47656 1     02376 1     50131 1     40002 1     02343 1     47656 1
05,2360       60266 0     10000 0     02365 0     00122 0     02365 0     54106 1     50000 1     35175 1
05,2370       54264 0     50106 0     40114 1     03222 0     56106 0     02361 1     54107 0     22002 0
```

OCTAL LISTING OF PARAGRAPH # 045, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
05,2400        47657 0      60267 1      00006 1      12417 0      50124 0      32442 1      50000 1      30000 1
05,2410        75226 0      05207 1      60107 1      10000 0      00001 0      05464 1      02324 0      00001 0
05,2420        22002 0      30132 1      67657 1      00006 1      12436 0      50124 0      02426 0      02431 0
05,2430        00001 0      02713 0      02236 1      00001 0      24131 1      00001 0      00006 1      50304 0

05,2440        00000 1      40000 0      12343 0   C: 00133 0   C: 00132 1      50124 0      32442 1      50000 1
05,2450        30000 1      75226 0      05207 1      54103 1      54106 1      60131 1      50000 1      40000 0
05,2460        50106 0      56270 1      10106 1      02454 0      37665 0      54141 1      54142 1      50103 0
05,2470        35175 1      54264 0      50103 0      40270 0      54140 0      02734 0      54107 0      00006 1

05,2500        32512 0      52006 0      50124 0      02503 0      02507 1      02721 1      02522 0      02713 0
05,2510        02522 0   C: 02037 1   C: 34000 0      04063 0   C: 11101 1      10103 1      02520 1      00122 0
05,2520        54103 1      02464 0      50000 1      32525 1      04105 1   C: 11277 0   C: 12513 0   C: 10555 0
05,2530     C: 10642 0   C: 10647 0   C: 10654 1   C: 10563 0   C: 10656 0      47656 1      02376 1      32673 1

05,2540        02314 0      02252 0      32674 0      02314 0      02254 0      32675 1      02314 0      02256 1
05,2550        46162 0      02676 1      00006 1      32076 1      52006 0      37665 0      02762 0      50131 1
05,2560        54000 0      37657 1      02762 0      50131 1      54001 1      37656 0      02762 0      50131 1
05,2570        54002 1      02663 0      47657 0      02376 1      32673 1      02314 0      02252 0      32674 0

05,2600        02314 0      02254 0      47664 0      02676 1      00006 1      32076 1      52006 0      37665 0
05,2610        02762 0      50131 1      54000 0      37657 1      02762 0      50131 1      54001 1      02663 0
05,2620        02252 0      00006 1      32076 1      52006 0      37665 0      02762 0      50131 1      54000 0
05,2630        02663 0      47657 0      02376 1      37641 0      54302 1      02254 0      00006 1      32076 1

05,2640        52006 0      37657 1      02762 0      50131 1      54001 1      02663 0      47656 1      02376 1
05,2650        37641 0      54302 1      02256 1      00006 1      32076 1      52006 0      37656 0      02762 0
05,2660        50131 1      54002 1      02663 0      37665 0      54265 1      47665 1      54301 1      45237 0
05,2670        54264 0      04102 0   C: 11422 0   C: 00021 1   C: 00022 1   C: 00023 0      54103 1      40265 1

05,2700        54021 0      40021 0      40021 0      10000 0      12706 0      00002 0      60103 0      00006 1
05,2710        12712 0      02324 0      00002 0      56002 0      54100 1      35225 1      70133 1      05200 0
05,2720        00100 0      56002 0      54100 1      50103 0      32753 1      54001 1      50103 0      35224 0
05,2730        70137 0      50001 0      00000 1      00100 0      56002 0      54100 1      50124 0      02737 0

05,2740        02756 1      50103 0      32753 1      54001 1      50103 0      35224 0      70133 1      50001 0
05,2750        00000 1      60000 1      00100 0      02712 1      05200 0      05207 1      35224 0      70133 1
05,2760        60000 1      00100 0      54103 1      56002 0      54101 0      37665 0      54105 1      50103 0
05,2770        56273 1      54141 1      50103 0      56270 1      54140 0      50124 0      02776 0      03023 0
```

```
OCTAL LISTING OF PARAGRAPH # 046, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

05,3000       50103 0     30134 1     75234 0     05161 1     00006 1     60103 0     54131 0     10265 1
05,3010       03051 0     02721 1     02236 1     03040 0     24131 1     30131 1     26103 1     37665 0
05,3020       50103 0     53777 0     03040 0     05167 1     10265 1     03051 0     02713 0     02236 1
05,3030       03034 0     37665 0     54103 1     03014 1     30132 1     67657 1     00006 1     13044 0

05,3040       56140 1     00101 1  C: 02045 1  C: 34000 0     56140 1     00006 1     50304 0     01000 0
05,3050       02663 0     02734 0     54107 0     00006 1     33043 0     52006 0     50124 0     03057 0
05,3060       03063 1     02721 1     03064 0     02713 0     50000 1     33067 0     04105 1  C: 11277 0
05,3070    C: 11003 1  C: 10723 0  C: 10773 0  C: 11023 0  C: 11050 1  C: 11006 1  C: 11023 0     47641 1

05,3100       70304 1     54141 1     33401 1     70266 1     05207 1     54022 0     56022 1     60267 1
05,3110       54140 0     40324 0     67656 0     10000 0     05364 0     03121 0     05464 1     37665 0
05,3120       54277 1     00004 0     10305 0     03130 0     37657 1     04536 0  C: 03134 1  C: 12000 1
05,3130       52141 1     52306 0     00003 1     00122 0     05257 1     10306 0     03142 0     03142 0

05,3140       03153 0     03153 0     33157 1     04536 0  C: 03134 1  C: 12000 1     35233 0     04363 0
05,3150    C: 03160 0  C: 12000 1     04602 1     37665 0     54305 0     54306 0     04602 1  C: 00144 0
05,3160       10306 0     03165 0     03165 0     04440 0     04440 0     10277 1     03212 0     33401 1
05,3170       70305 0     54107 0     05123 1     04440 0     33210 1     70305 0     05200 0     54020 1

05,3200       56020 0     54266 1     33211 0     54122 1     47641 1     70306 0     54142 1     02037 1
05,3210    C: 00700 0  C: 05100 0     05253 0     04440 0     35175 1     54264 0     30304 0     04116 0
05,3220       03222 0     04440 0     54022 0     56002 0     54101 0     37642 0     26264 0     37655 0
05,3230       54123 0     40022 0     40022 0     40022 0     40000 0     77663 1     50000 1     34741 1

05,3240       75224 1     54110 0     56264 1     54127 1     10000 0     54264 0     04102 0  C: 11271 0
05,3250       10123 0     03230 0     45237 0     54264 0     00101 1     54020 1     56002 0     54101 0
05,3260       37657 1     54123 0     40020 1     40020 1     56020 0     54022 0     03235 0     03302 0
05,3270       37665 0     56267 1     54140 0     35240 1     54264 0     04063 0  C: 10541 0     30140 1

05,3300       04102 0  C: 11277 0     40002 1     54300 0     35240 1     54264 0     37665 0     54267 0
05,3310       04063 0  C: 10541 0     05274 0     00122 0     37657 1     70333 0     10000 0     03336 1
05,3320       35227 0     54140 0     47657 0     70333 0     54144 1     05341 1     35150 0     54143 0
05,3330       00006 1     30335 1     52142 1     30144 0     00004 0     00140 1     35232 1     03321 1

05,3340       35230 0     54140 0     30333 1     03324 1     33363 1     54122 1     33401 1     70107 0
05,3350       54140 0     33402 1     70107 0     05200 0     54020 1     56020 0     54141 1     10140 0
05,3360       03364 0     56141 0     02314 0     05127 0     10141 1     03371 1     56140 1     02274 1
05,3370       05127 0     56141 0     02314 0     56140 1     02274 1     37665 0     54301 1     54302 1
```

OCTAL LISTING OF PARAGRAPH # 047, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
05,3400       02031 1    C: 00077 1    C: 07700 1       35241 0       56264 1       54124 1       30276 1       22002 0
05,3410       03255 0       56124 0       54264 0       00001 0       00004 0       47657 0       70370 1       67657 1
05,3420       54370 1       33457 1       00006 1       05011 1       33460 0       54322 0       37646 1       00006 1
05,3430       05013 0       37661 1       54103 1       43455 1       50103 0       54307 1       10103 1       03432 1

05,3440       43456 1       54310 1       54313 1       54315 1       37660 0       54303 0       00003 1       33462 1
05,3450       00004 0       04536 0    C: 03463 0    C: 12000 1       04440 0    C: 05675 0    C: 07675 1    C: 00175 1
05,3460    C: 40650 0    C: 00115 1    C: 00764 1       35233 0       04363 0    C: 03470 1    C: 12000 1       04602 1
05,3470       43461 0       00004 0       00006 1       03011 1       47646 0       00006 1       03013 0       37641 0

05,3500       54322 0       43521 0       70370 1       64515 1       54370 1       43523 1       70367 1       64514 0
05,3510       54367 1       43522 0       70413 0       67651 1       54413 0       00003 1       02001 1       04102 0
05,3520    C: 11315 0    C: 16001 1    C: 00330 1    C: 55000 1       03524 1       03525 0  CKSM 72644 1         @
05,3530         @             @             @             @             @             @             @             @

05,3540         @             @             @             @             @             @             @             @
05,3550         @             @             @             @             @             @             @             @
05,3560         @             @             @             @             @             @             @             @
05,3570         @             @             @             @             @             @             @             @

05,3600         @             @             @             @             @             @             @             @
05,3610         @             @             @             @             @             @             @             @
05,3620         @             @             @             @             @             @             @             @
05,3630         @             @             @             @             @             @             @             @

05,3640         @             @             @             @             @             @             @             @
05,3650         @             @             @             @             @             @             @             @
05,3660         @             @             @             @             @             @             @             @
05,3670         @             @             @             @             @             @             @             @

05,3700         @             @             @             @             @             @             @             @
05,3710         @             @             @             @             @             @             @             @
05,3720         @             @             @             @             @             @             @             @
05,3730         @             @             @             @             @             @             @             @

05,3740         @             @             @             @             @             @             @             @
05,3750         @             @             @             @             @             @             @             @
05,3760         @             @             @             @             @             @             @             @
05,3770         @             @             @             @             @             @             @             @
```

```
OCTAL LISTING OF PARAGRAPH # 050, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

06,2000        05317 1     32054 1     10000 0     54142 1     32057 1     05332 0     24142 0     32055 0
06,2010        05332 0     05140 1     02015 1     02014 0     02004 1     32056 0     05332 0     05140 1
06,2020        04437 0     02024 0     30333 1     02002 1     32060 0     05332 0     00004 0     37656 0
06,2030        04536 0  C: 02065 0  C: 14004 0     37657 1     04536 0  C: 02220 0  C: 14004 0     36165 0

06,2040        04536 0  C: 02315 1  C: 14004 0     37655 0     04536 0  C: 02435 1  C: 14004 0     37664 1
06,2050        04536 0  C: 02523 1  C: 14004 0     04437 0  C: 02007 1  C: 02102 0  C: 02130 1  C: 00401 1
06,2060     C: 04700 1     11407 1     02064 1     04602 1     55407 1     51407 0     11410 1     02071 0
06,2070        02061 1     51407 0     31420 0     04536 0  C: 02110 0  C: 14004 0     04602 1     37665 0

06,2100        00006 1     01005 0     00006 1     01006 0     51407 0     11410 1     51407 0     55410 1
06,2110        51407 0     11410 1     02114 1     02061 1     51407 0     31430 1     04536 0  C: 02122 1
06,2120     C: 14004 0     04602 1     51407 0     31440 0     55401 1     51407 0     31450 1     55402 1
06,2130        00006 1     00032 0     40000 0     55403 0     37663 0     55404 1     31403 1     51404 0

06,2140        77650 1     10000 0     02161 0     11404 1     02135 1     31401 0     00006 1     01005 0
06,2150        31402 0     00006 1     01006 0     51407 0     31460 1     04536 0  C: 02077 0  C: 14004 0
06,2160        04602 1     51404 0     42204 1     71401 1     55401 1     51404 0     42174 0     71402 1
06,2170        55402 1     05413 1  C: 01410 0     02143 0  C: 00010 0  C: 00020 0  C: 00004 0  C: 00200 0

06,2200     C: 00001 0  C: 00002 0  C: 00040 0  C: 00100 0  C: 00040 0  C: 00020 0  C: 00100 0  C: 00200 0
06,2210     C: 00010 0  C: 00001 0  C: 00004 0  C: 00002 0     11470 1     02217 1     04602 1     55470 1
06,2220        51470 0     11471 0     02224 1     02214 1     51470 0     31474 1     04536 0  C: 02250 1
06,2230     C: 14004 0     04602 1     44526 0     00006 1     02011 0     67642 0     00006 1     01011 0

06,2240        51470 0     11471 0     10000 0     02245 0     02214 1     67657 1     51470 0     55471 0
06,2250        51470 0     31502 1     55406 0     51470 0     31477 1     04536 0  C: 02261 0  C: 14004 0
06,2260        04602 1     44526 0     00006 1     02011 0     67643 1     00006 1     01011 0     11406 0
06,2270        02277 1     51470 0     31505 0     04536 0  C: 02232 0  C: 14004 0     04602 1     11406 0

06,2300        02302 1     02267 0     55406 0     32310 1     04536 0  C: 02277 1  C: 14004 0     04602 1
06,2310     C: 27340 0     11510 0     02314 0     04602 1     55510 0     51510 1     11511 1     02321 0
06,2320        02311 0     51510 1     31525 1     04536 0  C: 02342 0  C: 14004 0     04602 1     42426 1
06,2330        00006 1     03012 1     51510 1     11511 1     10000 0     02337 1     02311 0     67657 1

06,2340        51510 1     55511 1     51510 1     31541 0     04536 0  C: 02350 0  C: 14004 0     04602 1
06,2350        32425 0     00006 1     06032 0     72425 1     00006 1     12363 1     34533 0     04363 0
06,2360     C: 02376 1  C: 14004 0     04602 1     51510 1     31571 0     72426 1     00006 1     05012 1
06,2370        51510 1     31555 0     04536 0  C: 02327 0  C: 14004 0     04602 1     05317 1     32425 0
```

OCTAL LISTING OF PARAGRAPH # 051, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
06,2400       54333 0     32427 1     05332 0     32430 1     05332 0     05274 0     05140 1     04437 0
06,2410       02417 1     00004 0     37656 0     04536 0  C: 02350 0  C: 14004 0     04437 0     00004 0
06,2420       37656 0     04536 0  C: 02363 0  C: 14004 0     04437 0  C: 01400 1  C: 07400 1  C: 00125 1
06,2430    C: 05000 1     11605 1     02434 0     04602 1     55605 1     51605 0     11606 1     02441 1

06,2440       02431 0     51605 0     31614 0     04536 0  C: 02467 0  C: 14004 0     04602 1     51605 0
06,2450       31636 0     02505 0     67657 1     04536 0  C: 02457 0  C: 14004 0     04602 1     51605 0
06,2460       11606 1     10000 0     02464 0     02431 0     67657 1     51605 0     55606 1     51605 0
06,2470       31622 0     04536 0  C: 02475 0  C: 14004 0     04602 1     51605 0     31630 0     02505 0

06,2500       62522 0     04536 0  C: 02447 1  C: 14004 0     04602 1     54055 0     55405 0     37654 1
06,2510       00006 1     05014 1     31405 1     00006 1     62516 1     40000 0     40000 0     00006 1
06,2520       77646 0     00002 0  C: 00031 0     11654 0     02526 1     04602 1     36165 0     55655 1
06,2530       51655 0     31644 0     00006 1     51655 0     02030 0     51655 0     57644 0     51655 0

06,2540       31650 0     00006 1     51655 0     04030 0     51655 0     57650 0     11655 1     02527 0
06,2550       37661 1     04536 0  C: 02523 1  C: 14004 0     04602 1     02555 0     02556 0 CKSM 40777 1
06,2560         @           @           @           @           @           @           @           @
06,2570         @           @           @           @           @           @           @           @

06,2600         @           @           @           @           @           @           @           @
06,2610         @           @           @           @           @           @           @           @
06,2620         @           @           @           @           @           @           @           @
06,2630         @           @           @           @           @           @           @           @

06,2640         @           @           @           @           @           @           @           @
06,2650         @           @           @           @           @           @           @           @
06,2660         @           @           @           @           @           @           @           @
06,2670         @           @           @           @           @           @           @           @

06,2700         @           @           @           @           @           @           @           @
06,2710         @           @           @           @           @           @           @           @
06,2720         @           @           @           @           @           @           @           @
06,2730         @           @           @           @           @           @           @           @

06,2740         @           @           @           @           @           @           @           @
06,2750         @           @           @           @           @           @           @           @
06,2760         @           @           @           @           @           @           @           @
06,2770         @           @           @           @           @           @           @           @
```

OCTAL LISTING OF PARAGRAPH # 054, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
07,2000        32233 1     56003 1     54147 1     37655 0     54116 0     50000 1     30403 0     54106 1
07,2010        50116 1     41432 1     00006 1     71110 1     00006 1     77654 0     22107 1     50116 1
07,2020        31433 1     00006 1     70106 1     22110 1     00006 1     77652 0     20107 0     30110 1
07,2030        00006 1     77652 0     54001 1     37665 0     20107 0     00006 1     30107 1     50116 1

07,2040        52404 0     10116 0     67667 1     12004 0     12045 0     55457 1     54114 1     00006 1
07,2050        40404 0     52141 1     31443 0     02127 1     00006 1     40406 1     52141 1     41446 1
07,2060        02127 1     41440 1     02156 1     00006 1     40406 1     52141 1     31444 1     02127 1
07,2070        00006 1     40410 0     52141 1     41447 0     02127 1     41441 0     02156 1     00006 1

07,2100        40406 1     52141 1     31450 1     02127 1     00006 1     40410 0     52141 1     31445 0
07,2110        02127 1     31442 1     02156 1     11457 1     12116 1     12124 0     00004 0     34533 0
07,2120        04363 0  C: 02211 1  C: 16003 0     00003 1     30147 0     54003 0     14076 0     56140 1
07,2130        00006 1     70140 0     52107 0     30141 0     00006 1     70140 0     54001 1     37665 0

07,2140        20107 0     30106 0     00006 1     77647 1     50114 0     21452 1     30107 1     00006 1
07,2150        77647 1     54001 1     37665 0     50114 0     21452 1     00002 0     00006 1     22115 1
07,2160        00006 1     71110 1     22141 0     00006 1     77654 0     50114 0     21452 1     30141 0
07,2170        00006 1     77654 0     54001 1     37665 0     50114 0     21452 1     37656 0     60114 0

07,2200        56114 0     50000 1     11451 1     12205 0     00115 1     72255 0     10000 0     55457 1
07,2210        00115 1     37655 0     54114 1     50114 0     31452 0     00006 1     77650 1     50114 0
07,2220        55452 1     37665 0     50114 0     57451 0     00006 1     77650 1     50114 0     21452 1
07,2230        10114 1     67667 1     12212 0  C: 01451 0     32233 1     04063 0  C: 26317 0     04063 0

07,2240     C: 26716 0     14440 1     37655 0     54114 1     50114 0     31452 0     00006 1     77650 1
07,2250        50114 0     23452 0     10114 1     67667 1     12243 1  C: 77776 1     14440 1     30025 0
07,2260        57110 0     40000 0     61110 0     10000 0     67657 1     12272 0     12270 1     14440 1
07,2270        40000 0     67637 1     00006 1     77646 0     52107 0     00006 1     30107 1     52141 1

07,2300        37665 0     55457 1     54114 1     41440 1     02322 0     00006 1     40107 0     52141 1
07,2310        31441 1     02322 0     00006 1     40107 0     52141 1     41442 0     02322 0     11457 1
07,2320        12211 0     14440 1     56002 0     54115 0     30002 0     00006 1     70140 0     50114 0
07,2330        21452 1     30002 0     00006 1     70141 1     54001 1     37665 0     50114 0     21452 1

07,2340        12176 1     57110 0     40000 0     60140 1     12263 0     32233 1     56003 1     54147 1
07,2350        37665 0     55451 1     55452 1     55453 0     55454 1     55455 0     55456 0     30147 0
07,2360        54003 0     14076 0     54016 1     56002 0     54012 0     05257 1     35224 0     00006 1
07,2370        02015 1     54077 0     35233 0     04363 0  C: 02002 1  C: 10000 0     30077 1     50071 1
```

OCTAL LISTING OF PARAGRAPH # 055, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
07,2400      54140 0      04606 0      54016 1      56002 0      54012 0      05257 1      37665 0      56045 0
07,2410      54077 0      37655 0      00006 1      05011 1      35224 0      70077 0      56077 1      56021 1
07,2420      55070 0      02465 1      75224 1      62477 1      02474 1      02465 1      75224 1      40000 0
07,2430      02474 1      02461 0      42436 0      60077 1      10000 0      02444 1   C: 00022 1      02444 1

07,2440      47657 0      70342 0      54342 0      02450 1      37657 1      70342 0      10000 0      04606 0
07,2450      56077 1      02371 0      02461 0      47657 0      70342 0      67657 1      54342 0      04606 0
07,2460      04606 0      57070 1      60000 1      54021 0      00002 0      40021 0      40021 0      40021 0
07,2470      40021 0      40021 0      40000 0      00002 0      60077 1      10000 0      02452 0   C: 77740 1

07,2500      02452 0      00002 0      02502 1      02503 0 CKSM 04763 1         @            @            @
07,2510        @            @            @            @            @            @            @            @
07,2520        @            @            @            @            @            @            @            @
07,2530        @            @            @            @            @            @            @            @

07,2540        @            @            @            @            @            @            @            @
07,2550        @            @            @            @            @            @            @            @
07,2560        @            @            @            @            @            @            @            @
07,2570        @            @            @            @            @            @            @            @

07,2600        @            @            @            @            @            @            @            @
07,2610        @            @            @            @            @            @            @            @
07,2620        @            @            @            @            @            @            @            @
07,2630        @            @            @            @            @            @            @            @

07,2640        @            @            @            @            @            @            @            @
07,2650        @            @            @            @            @            @            @            @
07,2660        @            @            @            @            @            @            @            @
07,2670        @            @            @            @            @            @            @            @

07,2700        @            @            @            @            @            @            @            @
07,2710        @            @            @            @            @            @            @            @
07,2720        @            @            @            @            @            @            @            @
07,2730        @            @            @            @            @            @            @            @

07,2740        @            @            @            @            @            @            @            @
07,2750        @            @            @            @            @            @            @            @
07,2760        @            @            @            @            @            @            @            @
07,2770        @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 060, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

10,2000      02013 1      04554 1   C: 00144 0      47657 0      70413 0      54413 0      40061 1      77651 0
10,2010      10000 0      14602 0      13235 1      00006 1      23460 1      37657 1      00006 1      05012 1
10,2020      04554 1   C: 00002 0      37665 0      54035 0      54036 0      47657 0      00006 1      03012 1
10,2030      04554 1   C: 00454 1      47643 0      70413 0      54413 0      30035 1      04763 1   C; 57777 1

10,2040      12043 0      37665 0      12044 1      37644 0      56413 1      74360 1      26413 0      05042 1
10,2050      01460 1      02106 1      37657 1      70413 0      10000 0      12060 1      05413 1   C; 00501 0
10,2060      04554 1   C: 00002 0      37644 0      70413 0      10000 0      37641 0      02150 1      37644 0
10,2070      70413 0      10000 0      47642 1      02153 1      47645 0      70413 0      54413 0      77646 0

10,2100      10000 0      12422 0      47656 1      00006 1      03012 1      14602 0      37656 0      00006 1
10,2110      05012 1      37665 0      54362 1      54363 0      00002 0      37644 0      70413 0      10000 0
10,2120      37641 0      02150 1      32137 0      02153 1      40413 0      77644 1      10000 0      32141 1
10,2130      62141 1      02150 1      02142 1      47642 1      70413 0      54413 0      02431 0   C; 70000 0

10,2140   C: 67070 1   C: 61615 1      22413 1      37644 0      00006 1      06001 0      54413 0      00002 0
10,2150      55461 1      37665 0      12155 0      55461 1      37657 1      55462 1      00006 1      23460 1
10,2160      12163 0      04554 1   C: 00062 0      40413 0      74520 0      00006 1      12074 1      31461 0
10,2170      00006 1      51462 0      20035 0      54002 1      00006 1      72212 0      54001 1      30002 0

10,2200      04763 1   C: 77644 1      12204 1      01460 1      11462 1      12207 1      56001 0      52424 1
10,2210      02213 0      12161 1   C: 22715 1      22002 0      37657 1      54066 0      50000 1      30423 1
10,2220      54065 0      04763 1   C: 77177 0      12241 0      30065 1      50066 1      56362 0      40000 0
10,2230      60065 1      50066 1      54053 0      10066 0      12215 1      34506 0      00006 1      05014 1

10,2240      00001 0      10065 0      42222 0      12245 1      32222 1      54065 0      12225 1      00004 0
10,2250      47651 0      70061 1      67651 1      54061 1      37657 1      70413 0      10000 0      12302 0
10,2260      37645 1      70413 0      10000 0      13227 1      47643 0      70413 0      67643 1      54413 0
10,2270      37657 1      04536 0   C: 02304 1   C; 20003 0      40413 0      77656 1      10000 0      12302 0

10,2300      05413 1   C: 00510 0      00003 1      14076 0      02013 1      13235 1   I: 43030 0   C; 00427 0
10,2310   C: 00271 0   I: 66224 0   C: 33361 0   C: 00051 0   C: 00024 1   C; 22025 0   C: 00416 1   C; 36041 1
10,2320   C: 32473 0   I: 77634 0   C: 33267 1   I: 77776 1      00004 0      04777 1   C: 00423 1      12351 0
10,2330      24427 0      32350 0      54430 1      37646 1      26413 0      77645 0      10000 0      12345 0

10,2340      02106 1      37656 0      04536 0   C: 02422 1   C: 20003 0      00003 1      30427 0      14105 0
10,2350   C: 00074 1      02142 1      04777 1   C: 00425 1      12361 0      02142 1      37642 0      26413 0
10,2360      12330 1      02142 1      12345 0   I: 77430 0   C: 00427 0      00004 0      04777 1   C; 00423 1
10,2370      12402 1      00003 1      06000 1   I: 77634 0   C: 33243 1   C; 00416 1   I: 77414 0   C; 00071 1
```

```
OCTAL LISTING OF PARAGRAPH # 061, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

10,2400        00004 0     12331 0     02142 1     04777 1  C: 00423 1     12412 0     02142 1     37642 0
10,2410        26413 0     12371 1     37657 1     04536 0  C: 03251 1  C: 20003 0     02142 1     05413 1
10,2420     C; 00502 0     12346 0     37642 0     70413 0     10000 0     12115 1     12431 1     04554 1
10,2430     C: 00062 0     37645 1     70413 0     10000 0     12454 1     10413 0     12441 0     12441 0

10,2440        12461 1     40413 0     77646 0     10000 0     13235 1     10430 1     12460 0     05413 1
10,2450     C; 00503 1     42466 0     00006 1     03012 1     47646 0     70413 0     54413 0     13251 0
10,2460        54430 1     34524 0     04374 0  C; 02467 0  C; 20003 0     12427 0  C: 20002 1     00006 1
10,2470        30036 1     52424 1     06000 1  I: 77775 1  C: 00416 1  C: 00041 1  I: 45014 0  C; 00311 1

10,2500     C: 20507 1  C: 33361 0  I: 77731 1  C: 00051 0  C: 00024 1  C: 36025 0  C: 32473 0  I: 67201 0
10,2510     C: 00001 0  C: 00425 1  I: 41424 0  C; 33345 0  I: 65356 1  I; 41546 0  I; 65205 0  C; 00041 1
10,2520     C: 00045 0  I: 44205 0  C: 00001 0  I: 77626 0  C: 77352 0  I: 45135 1  C: 00424 0  C: 33345 0
10,2530     I: 71406 0  I: 73525 1  I: 41206 0  C: 00003 1  I: 65352 0  C: 00005 1  I: 41325 0  C: 00007 0

10,2540     C: 00001 0  I: 55552 0  I: 77441 0  C: 00041 1     40140 0     54423 0     40413 0     77644 1
10,2550        10000 0     12554 0     40424 1     54424 1     37665 0     54141 1     37657 1     54140 0
10,2560        50000 1     30423 1     00006 1     72635 1     50140 1     56423 1     04763 1  C: 77715 1
10,2570        24141 0     10140 0     12557 0     00004 0     10413 0     12600 1     12600 1     12625 0

10,2600        10141 1     12625 0     40061 1     77653 1     10000 0     12616 0     37642 0     00006 1
10,2610        05012 1     37654 1     00006 1     02033 0     10000 0     12630 1     47646 0     70413 0
10,2620        54413 0     47656 1     00006 1     03012 1     14440 1     47642 1     00006 1     03012 1
10,2630        40413 0     77645 0     10000 0     02213 0     14440 1  C; 21122 0     02652 1  C; 00017 1

10,2640        02653 0  C: 00016 0     02653 0  C: 00015 0     02653 0  C: 00014 1     02652 1  C: 00012 1
10,2650        02652 1  C: 00011 1     37657 1     00004 0     54421 1     00006 1     77655 1     52422 1
10,2660        10000 0     54425 0     67657 1     54414 1     32706 1     00006 1     02033 0     54427 1
10,2670        42637 0     00006 1     03013 0     50002 0     30000 1     00006 1     05013 0     00006 1

10,2700        30025 0     20422 1     37665 0     54001 1     52416 0     12302 0  C: 00230 0     54016 1
10,2710        00006 1     22012 1     00006 1     30036 1     52420 0     10414 1     12730 0     12723 1
10,2720        05413 1  C; 00520 0     04606 0     05413 1  C: 00521 1     47657 0     54414 1     03247 0
10,2730        54414 1     37655 0     00006 1     02013 1     00006 1     13014 0     30413 1     00006 1

10,2740        06033 1     77652 0     00006 1     12747 0     05413 1  C: 00522 1     02725 0     36165 0
10,2750        00006 1     06013 0     76165 1     00006 1     13010 1     37637 1     70046 1     63167 1
10,2760        54001 1     30046 0     60000 1     77657 0     52071 0     37650 0     03137 1     10425 0
10,2770        03000 1     47657 0     54414 1     40065 0     70413 0     54413 0     05042 1     03242 0
```

OCTAL LISTING OF PARAGRAPH # 062, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
10,3000      54425 0      10414 1      13004 1      13156 1      37654 1      00006 1      05013 0      04606 0
10,3010      37653 0      54065 0      37647 0      03047 1      37645 1      70413 0      10000 0      12725 1
10,3020      40413 0      77651 0      10000 0      12725 1      37644 0      70413 0      10000 0      37641 0
10,3030      00006 1      20035 0      04763 1   C: 66161 1      12725 1      37654 1      54065 0      37657 1

10,3040      00006 1      02013 1      54002 1      10000 0      13046 1      13060 0      37655 0      54001 1
10,3050      00006 1      02033 0      56001 0      70413 0      00006 1      06001 0      10000 0      03077 1
10,3060      37637 1      70046 1      54071 0      30046 0      60000 1      77657 0      54070 1      10002 1
10,3070      13111 1      00006 1      43171 1      20071 0      30065 1      03140 1      02771 1      22413 1

10,3100      67657 1      00006 1      06001 0      54413 0      32706 1      00006 1      02033 0      54427 1
10,3110      12725 1      10001 1      13114 1      13074 0      52071 0      20001 1      20001 1      20001 1
10,3120      52071 0      37655 0      00006 1      02013 1      00006 1      13074 0      33166 0      00006 1
10,3130      70071 0      54071 0      37665 0      56070 0      00006 1      73166 1      13073 1      54065 0

10,3140      00006 1      02033 0      54001 1      40065 0      70427 1      60001 0      56427 0      70065 0
10,3150      60001 0      10000 0      03001 0      52071 0      20416 0      00002 0      40065 0      70413 0
10,3160      60065 1      54413 0      52071 0      52416 0      05042 1      12723 1   C: 23773 0   C: 50437 1
10,3170   C: 00001 0   C: 01150 1      00004 0      47652 0      70413 0      67652 1      54413 0      37651 1

10,3200      00006 1      02033 0      00006 1      13227 1      37643 1      00006 1      05012 1      33234 1
10,3210      04536 0   C: 03214 0   C: 20003 0      02302 1      47643 0      00006 1      03012 1      37651 1
10,3220      00006 1      02033 0      00006 1      13244 1      05413 1   C: 00523 0      13251 0      37657 1
10,3230      04536 0   C: 03244 0   C: 20003 0      02302 1   C: 00764 1      37651 1      70413 0      10000 0

10,3240      13244 1      13251 0      47665 1      55070 0      37656 0      04102 0   C: 26667 1      47665 1
10,3250      55070 0      37656 0      04102 0   C: 26664 1      11435 0      13257 0      14602 0      04536 0
10,3260   C: 03254 1   C: 20007 1      34523 1      04363 0   C: 03274 0   C: 20007 1      33325 0      00006 1
10,3270      71434 1      61433 1      55431 1      14602 0      03326 0      04063 0   C: 26712 1      25436 1

10,3300      00004 0      52416 0      51434 0      53440 1      52420 0      51434 0      53442 0      52422 1
10,3310      51434 0      53444 0      41434 1      61432 0      00006 1      13320 1      31434 0      66162 1
10,3320      55434 1      11435 0      14440 1      14440 1      13274 1   C: 05341 1      37657 1      54117 1
10,3330      51431 0      33333 1      14067 0   C: 20650 0   C: 20646 1   C: 20644 0   C: 20642 0   C: 20640 1

10,3340   C: 20636 0      03341 1      03342 1 CKSM 67060 0         @            @            @            @
10,3350         @            @            @            @            @            @            @            @
10,3360         @            @            @            @            @            @            @            @
10,3370         @            @            @            @            @            @            @            @
```

OCTAL LISTING OF PARAGRAPH # 064, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
11,2000         02070 1      02073 1      02204 0      02566 0      02066 0      12126 1      02407 0      02401 0
11,2010         02262 0      02262 0      02262 0      02262 0      02266 1      02303 0      02377 0      02327 0
11,2020         03142 0      03210 1      02634 1      12524 1      12066 1      12066 1      12066 1      12066 1
11,2030         12066 1      12066 1      12066 1      13122 1      13130 1      12066 1      12066 1      02066 0

11,2040         37655 0      70332 1      10000 0      02053 0      47655 1      00004 0      70332 1      67655 0
11,2050         54332 1      00003 1      00002 0      05243 1      04440 0      05401 1      02060 0      04440 0
11,2060         47655 1      00004 0      70332 1      54332 1      00003 1      00002 0      05243 1      02056 0
11,2070         02076 1      02110 0      02117 1      02076 1      02132 0      02234 0      47653 1      60267 1

11,2100         00006 1      12065 1      24002 0      62107 0      00006 1      12065 1      02066 0   C: 77757 1
11,2110         02040 1      04063 0   C: 26000 0      04063 0   C: 26716 0      02116 0      02056 0      02040 1
11,2120         04063 0   C: 20247 1      04063 0   C: 26712 1      12125 1      12056 1      02040 1      04063 0
11,2130      C: 21172 0      12122 0      02040 1      05317 1      32152 0      05332 0      05140 1      02055 0

11,2140         02154 0      32153 1      05332 0      05401 1      04063 0   C: 26055 0      04063 0   C: 26716 0
11,2150         02056 0      02056 0   C: 02522 0   C: 04100 1      32202 0      05332 0      05140 1      02055 0
11,2160         02141 1      02163 1      02141 1      56002 0      54140 0      32203 1      54114 1      37656 0
11,2170         54141 1      50000 1      56336 1      04063 0   C: 33470 1      10114 1      54114 1      10141 1

11,2200         02170 0      00140 1   C: 02523 1   C: 00402 1      02040 1      05317 1      32232 0      05332 0
11,2210         05140 1      02055 0      02213 0      32233 1      05332 0      05401 1      04063 0   C: 26227 1
11,2220         04063 0   C: 26716 0      02056 0      32301 1      04063 0   C: 26317 0      04063 0   C: 26716 0
11,2230         02056 0      02056 0   C: 02567 1   C: 04200 1      02040 1      05317 1      32255 1      05332 0

11,2240         05140 1      02055 0      02243 0      04063 0   C: 23001 1      32153 1      05332 0      00004 0
11,2250         37642 0      04374 0   C: 02256 1   C: 22005 1      12055 1   C: 02441 1      06000 1   I: 77634 0
11,2260      C: 20363 0      02122 1      05300 1      02060 0      04102 0   C: 12002 0      02040 1      05317 1
11,2270         32232 0      05332 0      05140 1      02055 0      02275 0      32302 1      05332 0      05401 1

11,2300         12223 1   C: 00403 0   C: 05400 0      32326 1      54107 0      05123 1      04440 0      05140 1
11,2310         04440 0      04440 0      00004 0      37665 0      54142 1      54001 1      52025 1      52141 1
11,2320         52334 1      20141 1      07235 1      52141 1      20025 1      04440 0   C: 02124 1      10276 0
11,2330         12053 1      05317 1      32376 1      54142 1      32375 1      05332 0      05140 1      04437 0

11,2340         02332 1      04667 1   C: 00007 0      00004 0      37642 0      04374 0   C: 02351 1   C: 22005 1
11,2350         04440 0      35224 0      71546 0      50000 1      32356 0      04105 1   C: 22066 1   C: 36000 1
11,2360      C: 36024 1   C: 30000 1   C: 36245 1   C: 36445 1   C: 22364 0   C: 43413 0   C: 34556 0   C: 31324 0
11,2370      C: 31562 1   C: 31120 0   C: 22403 0   C: 31613 1   C: 23030 0   C: 02101 0   C: 02546 1      04102 0
```

```
OCTAL LISTING OF PARAGRAPH # 065, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

11,2400    C: 41454 1     04102 0  C: 14000 1     32472 1     54411 1     47657 0     12411 0     05317 1
11,2410       32473 0     54142 1     00004 0     42474 0     70413 0     54413 0     32474 1     00006 1
11,2420       02033 0     26413 0     00003 1     32444 1     54003 0     56142 0     55435 0     37665 0
11,2430       55434 1     55436 0     32470 0     55432 1     32471 1     05332 0     05140 1     04437 0

11,2440       12475 1     05401 1     11435 0     12447 0  C: 03431 1     04102 0  C: 21274 0     36162 1
11,2450       71431 1     10000 0     12456 0     55433 0     36162 1     12461 1     37656 0     55433 0
11,2460       32467 0     55432 1     00004 0     04536 0  C: 03254 1  C: 20007 1     04440 0  C: 00022 1
11,2470    C: 00102 1  C: 02101 0  C: 02253 1  C: 00145 1  C: 00444 0     00004 0     34523 1     04363 0

11,2500    C: 03274 0  C: 20007 1     00003 1     37664 1     55431 1     32523 1     05332 0     05274 0
11,2510       05140 1     02516 1     12514 1     12505 1     11431 1     12504 0     37665 0     55435 0
11,2520       04667 1  C: 00000 1     04437 0  C: 03300 1     10412 1     02066 0     30025 0     62564 1
11,2530       54001 1     02546 1     00004 0     32564 1     54412 1     04536 0  C: 02541 0  C: 22007 0

11,2540       04440 0     34526 1     04363 0  C: 02546 1  C: 22007 0     04602 1     00004 0     32565 0
11,2550       56411 0     54412 1     32563 0     04536 0  C: 02557 1  C: 22007 0     14440 1     37665 0
11,2560       56412 0     54411 1     14602 0  C: 01750 1  C: 02260 1  C: 02001 1     02040 1     42631 0
11,2570       00006 1     03012 1     05317 1     32152 0     05332 0     05140 1     02055 0     02600 0

11,2600       32632 1     05332 0     37652 1     00006 1     05012 1     37656 0     00004 0     04536 0
11,2610    C: 02613 1  C: 22007 0     12055 1     37656 0     54002 1     50000 1     30400 0     00006 1
11,2620       77643 0     50002 0     54050 0     10002 1     12614 1     32633 0     00006 1     05014 1
11,2630       14602 0  C: 00050 1  C: 04300 0  C: 70000 0     37657 1     00004 0     04536 0  C: 02644 0

11,2640    C: 22007 0     04440 0     04554 1  C: 00062 0     37656 0     55606 1     50000 1     31603 0
11,2650       00006 1     51606 0     06030 1     51606 0     72724 0     00006 1     12721 0     54002 1
11,2660       51606 0     23603 0     00006 1     06001 0     51606 0     55603 1     40000 0     56002 0
11,2670       70002 1     00006 1     12721 0     54001 1     31606 0     60000 1     60000 1     77655 1

11,2700       70001 1     00006 1     12714 0     36162 1     04536 0  C: 03264 1  C: 22006 1     37642 0
11,2710       04363 0  C: 02733 1  C: 22007 0     12721 0     32727 1     61606 0     54075 1     40002 1
11,2720       02745 0     11606 1     12645 0     12642 1  C: 00017 1  C: 77777 0  C: 03777 0  C: 00030 1
11,2730       02740 0  C: 00016 0     04606 0     05317 1     32737 0     05332 0     04437 0  C: 01645 1

11,2740       54075 1     50002 0     30000 1     24002 0     56075 0     54074 0     00006 1     22076 0
11,2750       34525 1     04363 0  C: 02763 1  C: 22007 0     52075 1     50071 1     52141 1     30025 0
11,2760       50071 1     54142 1     00076 0     05317 1     00006 1     30141 0     52334 1     30142 0
11,2770       54335 0     33000 1     05107 1     12775 1     04437 0     32777 1     05327 1  C: 22764 1
```

OCTAL LISTING OF PARAGRAPH # 066, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
11,3000   C: 00535 1     04112 1     54427 1     32523 1     05332 0     05274 0     05140 1     13012 0
11,3010      37653 0     13013 1     37665 0     00004 0     56061 0     73027 0     26061 1     77653 1
11,3020      10000 0     13024 0     37641 0     26413 0     00003 1     30427 0     14105 0  C: 77757 1
11,3030      33120 1     05332 0     05140 1     13055 0     13035 0     33121 0     05332 0     05140 1

11,3040      13055 0     13042 0     00004 0     47657 0     54351 1     00006 1     30353 1     52365 0
11,3050      37657 1     04536 0  C: 03063 1  C: 22007 0     14437 1     05401 1     04667 1  C: 00000 1
11,3060      04440 0     04554 1  C: 00062 0     00006 1     30356 1     52066 0     00006 1     40365 0
11,3070      20066 0     10065 0     13112 1     13075 1     13116 0     10066 0     13112 1     13101 0

11,3100      13116 0     37665 0     54354 1     52356 0     52353 0     37642 0     04363 0  C: 03056 1
11,3110   C: 22007 0     14602 0     30354 0     00006 1     63101 1     13061 1     40354 1     13113 0
11,3120   C: 02444 1  C: 02564 1     00004 0     47646 0     70765 1     67646 1     54765 1     14440 1
11,3130      00004 0     47646 0     70765 1     54765 1     00006 1     30033 1     52775 0     30034 0

11,3140      54776 0     14440 1     33263 0     56003 1     00004 0     30025 0     55502 0     32727 1
11,3150      55506 1     41502 0     60025 0     00006 1     13161 0     00006 1     30025 0     53503 1
11,3160      13167 0     11506 1     03150 0     00003 1     10067 1     04404 0     03147 0     05470 1
11,3170      53505 1     00003 1     47654 0     70367 1     67654 1     54367 1     37654 1     00006 1

11,3200      03012 1     37654 1     00006 1     05012 1     37645 1     00006 1     05013 0     04440 0
11,3210      33263 0     56003 1     05470 1     53507 0     00003 1     31506 0     00006 1     61504 1
11,3220      00006 1     63244 0     06000 1  I: 45345 1  C: 01507 1  C: 01505 0  I: 45061 1  C: 01606 0
11,3230   C: 33406 0  I: 77615 0  C: 01503 0  C: 01507 1  I: 77776 1     00006 1     31507 1     52025 1

11,3240      47645 0     00006 1     03013 0     04440 0     00006 1     37637 1     53511 1     06000 1
11,3250   I: 45345 1  C: 01511 0  C: 01505 0  I: 54215 0  C: 01507 1  C: 01606 0  I: 77615 0  C: 01503 0
11,3260   C: 01507 1  I: 77776 1     03235 0  C: 01400 1     37641 0     00006 1     02031 1     00006 1
11,3270      13272 1     13353 0     37655 0     00006 1     02031 1     10000 0     13353 0     37665 0

11,3300      54042 0     54043 1     54044 0     37650 0     67647 0     00006 1     05013 0     37653 0
11,3310      04536 0  C: 03314 1  C: 22006 1     04602 1     47650 1     00006 1     03013 0     37645 1
11,3320      00006 1     02032 1     00006 1     13325 1     03343 0     30042 1     00006 1     77646 0
11,3330      33360 1     00006 1     70001 1     55435 0     30044 1     00006 1     77646 0     33360 1

11,3340      00006 1     70001 1     55436 0     30043 0     00006 1     77646 0     33360 1     00006 1
11,3350      70001 1     55437 1     13264 0     37665 0     55435 0     55436 0     55437 1     04602 1
11,3360   C: 16171 1     03361 0     03362 0  CKSM 51136 1      @           @           @           @
11,3370         @           @           @           @           @           @           @           @
```

OCTAL LISTING OF PARAGRAPH # 070, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
12,2000          00004 0     02214 1     37641 0     54322 0     37665 0     55363 1     37665 0     55361 0
12,2010          54276 0     54412 1     54342 0     54032 1     54033 0     54034 1     55072 1     55074 1
12,2020          55076 0     55100 0     55102 1     55104 1     40000 0     55071 1     55073 0     55075 0
12,2030          55077 1     55101 1     55103 0     32433 1     54367 1     37646 1     04536 0  C; 02247 1

12,2040       C: 26003 0     00006 1     32443 0     52346 1     32450 1     54765 1     00006 1     32445 0
12,2050          52062 1     00006 1     32447 1     52064 1     37652 1     70322 0     10000 0     47647 1
12,2060          26367 1     00003 1     04063 0  C: 12001 0     14452 1     37642 0     04374 0  C: 77777 0
12,2070       C: 77777 0     14452 1     25362 1     02214 1     32436 1     70322 0     67641 0     56322 1

12,2100          77652 0     10000 0     37654 1     00006 1     05012 1     00006 1     32441 1     52346 1
12,2110          34535 0     04363 0  C: 02773 0  C: 02003 0     00006 1     00015 0     62431 0     00006 1
12,2120          12122 0     12130 0     37653 0     00006 1     02016 1     62432 0     00006 1     12006 1
12,2130          37664 1     54145 0     60000 1     00006 1     50000 1     31072 0     00006 1     06001 0

12,2140          10000 0     12203 0     12203 0     12203 0     10145 0     12131 1     54146 0     37664 1
12,2150          54145 0     60000 1     50000 1     11072 1     12177 0     12172 0     54140 0     50145 1
12,2160          32423 0     54001 1     24140 1     46027 0     70140 0     10000 0     12203 0     24146 1
12,2170          30001 0     04067 1     10145 0     12150 0     10146 0     12207 1     12006 1     54140 0

12,2200          50145 1     32415 0     12161 1     32206 1     55364 0     12006 1  C: 01107 0     32404 0
12,2210          70367 1     62434 0     54367 1     12054 0     56002 0     54114 1     37665 0     00006 1
12,2220          01012 0     00006 1     01014 0     00006 1     01011 0     34532 1     00006 1     01013 1
12,2230          37637 1     54030 0     54026 1     54027 0     32414 1     54003 0     37640 1     55407 1

12,2240          55406 0     55405 0     55404 1     55403 0     55402 1     55401 1     55400 0     44567 0
12,2250          55410 1     55412 0     55414 0     55416 1     55420 1     55422 0     55424 0     55426 1
12,2260          55430 0     44570 0     55411 0     55413 1     55415 1     55417 0     55421 0     55423 1
12,2270          55425 1     55427 0     55431 1     47665 1     54153 1     54167 0     54203 1     54217 1

12,2300          54233 1     54247 1     54263 1     54067 1     32412 1     54431 0     62413 0     54505 0
12,2310          62413 0     54561 1     62413 0     54635 0     62413 0     54711 1     37661 1     54351 1
12,2320          54140 0     47644 1     50140 1     54307 1     10140 0     02320 1     54045 1     54341 0
12,2330          54366 0     54323 1     54300 0     54302 1     54277 1     54305 0     54306 0     54324 0

12,2340          54266 1     54267 0     54327 0     54330 0     54331 1     54374 0     54332 1     54371 0
12,2350          54372 0     54373 1     54357 1     54350 0     37660 0     54303 0     47657 0     54414 1
12,2360          32411 1     54347 0     32435 1     54370 1     37652 1     00006 1     02033 0     62437 0
12,2370          54413 0     32410 0     55360 1     45237 0     54264 0     32406 1     54003 0     32405 1
```

OCTAL LISTING OF PARAGRAPH # 071, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
12,2400          55401 1       32407 0       54411 1       00114 0    C: 00035 1    C: 02052 1    C: 03401 1    C: 02321 0
12,2410       C: 02101 0    C: 04730 1    C: 00431 1    C: 00054 0    C: 01400 1    C: 00000 1    C: 42764 1    C: 00000 1
12,2420       C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1
12,2430       C: 00000 1    C: 77755 0    C: 77757 1    C: 37411 1    C: 37400 1    C: 16000 0    C: 00440 1    C: 00102 1

12,2440       C: 03141 0    C: 46006 0    C: 03115 1    C: 46006 0    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1
12,2450       C: 04012 0       54016 1       00006 1       22012 1       10366 0       12471 0       12471 0       35234 1
12,2460          70366 0       54366 0       64740 0       00006 1       01010 1       32562 1       54347 0       32563 0
12,2470          12546 0       10322 0       02501 1       02501 1       56322 1       75234 0       54322 0       64754 0

12,2500          02541 0       10303 0       12505 1       32522 0       12546 0       54303 0       47665 1       54077 0
12,2510          56341 1       67666 0       54341 0       50341 1       10307 1       10341 0       02511 0       02530 0
12,2520       C: 00012 1       10077 0    C: 37764 0       54303 0       12503 1       54077 0       32520 1       02512 0
12,2530          67657 1       50341 1       54307 1       75234 0       54077 0       35226 1       50341 1       74741 0

12,2540          60077 1       00006 1       01010 1       32561 1       54347 0       32564 1       54027 0       50350 1
12,2550          12551 0       02565 0       13440 0       12720 1       13545 1       02632 1       13440 0       12720 1
12,2560          13545 1    C: 04730 1    C: 04726 0    C: 37775 0    C: 37776 0       02640 1       47656 1       00006 1
12,2570          03014 1       10352 1       12576 0       12576 0       12602 0       54352 1       47657 0       52353 0

12,2600          52365 0       12622 1       30354 0       00006 1       72715 1       60365 1       54365 0       37665 0
12,2610          26364 1       37637 1       67657 1       60365 1       54365 0       37665 0       67637 1       60364 0
12,2620          54364 1       12712 0       10364 1       37641 0       60365 1       54060 0       32716 0       00006 1
12,2630          05014 1       12711 0       02640 1       37656 0       00006 1       05014 1       30354 0       12625 0

12,2640          10351 1       12711 0       12643 0       37652 1       00006 1       02030 0       10000 0       12706 0
12,2650          10351 1       12652 0       12673 0       37650 0       00006 1       05012 1       37665 0       54351 1
12,2660          54363 0       54362 1       36162 1       04536 0    C: 02667 1    C: 24006 1       02711 1       37656 0
12,2670          00006 1       05012 1       04602 1       40363 0       60360 1       54054 1       30360 1       54363 0

12,2700          40362 1       60361 0       54053 0       30361 0       54362 1       00002 0       42717 0       00006 1
12,2710          03012 1       13752 0       37665 0       54001 1       12600 1    C: 06432 1    C: 06004 0    C: 00202 1
12,2720          30367 0       00006 1       06030 1       73412 1       00006 1       12755 0       54074 0       22367 0
12,2730          00006 1       06001 0       54367 1       47657 0       56074 1       00006 1       63205 0       12741 0

12,2740          67657 1       24074 1       60000 1       54000 0       12741 0       56075 0       50074 1       37642 0
12,2750          70367 1       50074 1       03406 0       10075 1       12740 1       40367 1       77651 0       10000 0
12,2760          13103 1       37650 0       70367 1       10000 0       12770 1       37650 0       26367 1       13103 1
12,2770          43430 1       70367 1       54367 1       77642 1       10000 0       13066 0       40367 1       77647 1
```

OCTAL LISTING OF PARAGRAPH # 072, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
12,3000         10000 0       13004 1       05413 1    C; 00213 1       03373 0       33436 0       04536 0    C; 03014 1
12,3010      C: 24006 1       13103 1       33436 0       04557 1       47656 1       70367 1       56367 0       77656 1
12,3020         00006 1       13034 1       37642 0       70367 1       00006 1       13012 0       40061 1       77650 1
12,3030         10000 0       14602 0       04102 0    C: 26641 0       37641 0       00006 1       05012 1       04755 1

12,3040         43425 0       00006 1       03012 1       34762 0       04557 1       43426 0       70367 1       54367 1
12,3050         03344 1       47641 1       00006 1       03012 1       37645 1       04536 0    C: 02262 0    C; 26006 0
12,3060         40061 1       77650 1       10000 0       14602 0       04102 0    C: 26633 0       37650 0       70061 1
12,3070         10000 0       13103 1       03401 1       37653 0       00006 1       05012 1       37652 1       04536 0

12,3100      C: 03037 0    C: 24006 1       13103 1       30370 0       74515 0       54001 1       34515 1       00006 1
12,3110         03033 1       00006 1       06001 0       00006 1       13143 0       54074 0       22370 0       00006 1
12,3120         06001 0       54370 1       37665 0       56074 1       60000 1       13130 1       67657 1       24074 1
12,3130         60000 1       54000 0       13127 1       56075 0       50074 1       37643 1       70370 1       50074 1

12,3140         03414 0       10075 1       13126 0       10034 1       13150 1       13156 1       13150 1       13156 1
12,3150         63203 0       00006 1       63155 0       37652 1       13156 1       37665 0       60322 1       77652 0
12,3160         00006 1       13752 0       70322 0       10000 0       13200 1       37652 1       70367 1       10000 0
12,3170         13752 0       40322 0       77652 0       67641 0       56322 1       73204 0       26322 0       13752 0

12,3200         03417 0       13752 0       13171 1    C: 63434 1    C: 37737 0       77637 0       54075 1       10367 1
12,3210         13216 0       13216 0       37654 1       00006 1       05011 1       12753 0       03417 0       12753 0
12,3220         47654 0       00006 1       03011 1       12753 0       37656 0       70367 1       10000 0       12753 0
12,3230         37642 0       70367 1       00006 1       13247 1       37641 0       00006 1       02012 0       00006 1

12,3240         13242 1       12753 0       37656 0       26367 1       05413 1    C: 00207 1       12753 0       47651 0
12,3250         70367 1       67651 1       54367 1       12753 0       10000 0       12753 0       43433 1       00006 1
12,3260         03014 1       03373 0       37665 0       54050 0       54051 1       54052 1       54047 0       43432 0
12,3270         00006 1       03014 1       12753 0       00006 1       13304 1       40061 1       77650 1       10000 0

12,3300         12753 0       05413 1    C: 00214 0       12753 0       37656 0       70367 1       10000 0       12753 0
12,3310         13247 1       10000 0       37646 1       56367 0       73435 1       26367 1       03344 1       40367 1
12,3320         77657 0       10000 0       13141 1       30367 0       73431 0       10000 0       13141 1       05413 1
12,3330      C; 00212 0       13141 1       10000 0       13141 1       05413 1    C; 01105 1       13141 1       10000 0

12,3340         13141 1       05413 1    C: 01106 1       13141 1       33424 0       70367 1       00006 1       77646 0
12,3350         30367 0       00006 1       04001 1       40000 0       74514 1       10000 0       13367 1       37657 1
12,3360         70370 1       10000 0       00002 0       47657 0       00006 1       03011 1       00002 0       37657 1
12,3370         00006 1       05011 1       00002 0       43434 0       00006 1       03012 1       33425 1       00006 1
```

```
OCTAL LISTING OF PARAGRAPH # 073, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

12,3400        05012 1       43427 1       70367 1       63427 0       54367 1       00002 0       13224 1       13344 0
12,3410        13344 0       13254 0    C: 76400 1       13273 0       13311 0       13332 1       13337 1       40370 1
12,3420        77657 0       10000 0       24002 0       00002 0    C: 00015 0    C: 00030 1    C: 00054 0    C: 00075 0
12,3430     C: 00300 1    C: 01720 0    C: 01700 1    C: 71000 1    C: 40040 1    C: 76777 1    C: 21450 0    C: 00014 1

12,3440        30413 1       00006 1       06033 1       77656 1       00006 1       13501 1       22413 1       00006 1
12,3450        06001 0       54413 0       77656 1       10000 0       13473 0       37651 1       70061 1       10000 0
12,3460        13501 1       43472 1       70413 0       63472 0       54413 0       37657 1       04536 0    C: 02000 0
12,3470     C: 20006 0       13545 1    C: 10001 1       40061 1       77651 0       10000 0       13501 1       05413 1

12,3500     C: 00514 1       30413 1       00006 1       06030 1       77651 0       00006 1       13521 0       37656 0
12,3510        70413 0       10000 0       13545 1       37651 1       22413 1       00006 1       06001 0       54413 0
12,3520        05042 1       33543 0       70413 0       10000 0       13545 1       04777 1    C: 00035 1       13531 1
12,3530        13545 1       37645 1       26413 0       43544 0       00006 1       03012 1       37656 0       04536 0

12,3540     C: 02051 1    C: 20006 0       13545 1    C: 32002 1    C: 20002 1       30034 0       04233 1       55404 1
12,3550        30034 0       04232 0       55466 0       30032 0       04233 1       55401 1       41401 1       00006 1
12,3560        71466 0       55406 0       30032 0       04232 0       55403 0       00006 1       71466 0       55405 0
12,3570        31466 1       67640 1       00006 1       63610 0       31403 1       00006 1       77642 1       00006 1

12,3600        11466 0       55400 0       41401 1       00006 1       77642 1       00006 1       11466 0       13621 0
12,3610        11403 0       37637 1       13614 0       37641 0       55400 0       11401 1       37637 1       13621 0
12,3620        37641 0       55402 1       37643 1       00006 1       02031 1       00006 1       13635 0       40765 1
12,3630        77643 0       10000 0       13635 0       33747 0       13636 0       33751 1       55415 1       37656 0

12,3640        00006 1       02030 0       10000 0       13725 0       37643 1       00006 1       02011 0       10000 0
12,3650        13660 0       47650 1       70765 1       54765 1       33751 1       55647 1       55646 0       14606 1
12,3660        37650 0       70765 1       10000 0       14606 1       33750 0       55415 1       37650 0       26765 1
12,3670        41415 1       55647 1       37665 0       55646 0       37665 0       55640 0       55641 1       55671 1

12,3700        31417 1       55644 1       31421 1       55645 0       33746 1       04536 0    C: 03064 0    C: 52006 0
12,3710        37657 1       04536 0    C: 03525 0    C: 52006 0       37657 1       04536 0    C: 03536 1    C: 52006 0
12,3720        37657 1       04536 0    C: 03547 1    C: 52006 0       14606 1       37643 1       00006 1       02011 0
12,3730        10000 0       13742 1       47656 1       70765 1       67656 0       54765 1       37665 0       55642 1

12,3740        55643 0       14606 1       33750 0       55415 1       14606 1       14606 1    C: 00310 0    C: 00707 1
12,3750     C: 00133 0    C: 00033 1       11510 0       14606 1       31511 0       00006 1       06032 0       75235 1
12,3760        00006 1       14606 1       00006 1       33766 0       52006 0    C: 03416 1    C: 52006 0       03767 1
12,3770        03770 1  CKSM 72316 0          @             @             @             @             @             @
```

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OCTAL LISTING OF PARAGRAPH # 074, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

13,2000        00004 0      47650 1      70061 1      67650 0      54061 1      02650 0      12033 1      42743 1
13,2010        70367 1      62743 0      54367 1      42744 0      00006 1      03012 1      37653 0      00006 1
13,2020        05012 1      37652 1      04536 0   C: 02035 0   C: 26003 0      40367 1      77647 1      10000 0
13,2030        12033 1      05413 1   C: 00210 1      00003 1      14076 0      02650 0      14602 0      04755 1

13,2040        47653 1      00006 1      03012 1      34762 0      04557 1      02650 0      14602 0      42743 1
13,2050        70367 1      54367 1      04156 1   C: 25344 0      12633 1      37654 1      00004 0      00006 1
13,2060        05012 1      47654 0      70367 1      67654 1      54367 1      36162 1      04536 0   C: 02072 0
13,2070     C: 26003 0      12033 1      02643 1      37652 1      00006 1      05012 1      37656 0      55454 1

13,2100        51454 0      30400 0      00006 1      51454 0      20032 1      00006 1      77643 0      56001 0
13,2110        60000 1      54065 0      12114 0      26001 1      51454 0      23451 0      11454 1      02077 0
13,2120        37656 0      04557 1      02643 1      54065 0      37656 0      55454 1      51454 0      11451 1
13,2130        02134 0      02143 0      02206 1      02143 0      62747 1      00006 1      62216 0      51454 0

13,2140        55451 1      42750 0      24065 1      51454 0      54050 0      11454 1      02125 0      10065 0
13,2150        12222 0      04554 1   C: 00226 1      37656 0      54065 0      50000 1      30032 0      00006 1
13,2160        50065 1      20400 1      10000 0      12177 0      12166 0      12177 0      10065 0      12154 1
13,2170        55451 1      55452 1      55453 0      55454 1      55455 0      55456 0      12633 1      62205 1

13,2200        00006 1      62166 1      05413 1   C: 00211 0      12641 1   C: 77511 1      62747 1      00006 1
13,2210        62216 0      40000 0      51454 0      55451 1      32750 1      02142 1      37665 0      51454 0
13,2220        57451 0      02142 1      32746 0      00006 1      05014 1      32751 0      12121 0      00004 0
13,2230        02655 0      42745 1      00006 1      03012 1      37646 1      04536 0   C: 02247 1   C: 26003 0

13,2240        32752 0      04536 0   C: 02245 0   C: 26003 0      12033 1      02643 1      12633 1      02650 0
13,2250        14602 0      37654 1      00006 1      02012 0      10000 0      14602 0      47654 0      70367 1
13,2260        54367 1      14602 0      02650 0      14602 0      47653 1      12257 1      02650 0      14076 0
13,2270        00004 0      37665 0      54037 1      54040 1      54041 0      47657 0      70367 1      54367 1

13,2300        04156 1   C: 25344 0      12033 1      00004 0      47657 0      70367 1      67657 1      54367 1
13,2310        77646 0      10000 0      12033 1      05413 1   C: 00212 0      00004 0      12300 1      54145 0
13,2320        02655 0      10357 1      02364 1      54142 1      37652 1      00006 1      05014 1      37655 0
13,2330        00004 0      04536 0   C: 02402 0   C: 26003 0      30145 1      56003 1      56145 1      54357 1

13,2340        75235 1      54065 0      37656 0      54143 0      60000 1      60065 1      54144 1      00006 1
13,2350        50000 1      31401 0      52141 1      07235 1      52141 1      50144 0      53401 1      10143 0
13,2360        12343 0      30145 1      54003 0      12033 1      00006 1      30120 1      52141 1      32401 0
13,2370        14416 1      10357 1      12367 0      54142 1      00006 1      30141 0      52120 0      37657 1
```

```
OCTAL LISTING OF PARAGRAPH # 075, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

13,2400       12330 1   C: 26371 0      42630 1      00006 1      03014 1      02643 1      30357 0      00006 1
13,2410       77654 0      50000 1      12413 1      02442 1   C: 00202 1      02442 1   C: 00302 0      02440 0
13,2420    C: 00100 0      37665 0      54357 1      32401 0      04422 1      37656 0      70370 1      10000 0
13,2430       12437 1      10071 0      12437 1      12437 1      47652 0      00006 1      03014 1      12245 1

13,2440       47655 1      26357 1      50002 0      30000 1      54071 0      77663 1      67643 1      26357 1
13,2450       54003 0      75235 1      54065 0      47663 1      70071 0      54071 0      00006 1      50065 1
13,2460       31401 0      52075 1      10074 0      12476 1      12466 0      12611 1      10075 1      12473 1
13,2470       12406 0      12606 1      12406 0      62527 0      00006 1      62406 1      00006 1      32632 1

13,2500       20075 1      30071 1      00006 1      05014 1      36027 1      70075 1      56075 0      00006 1
13,2510       77650 1      54066 0      30074 1      00006 1      77647 1      54074 0      30001 0      00006 1
13,2520       77642 1      26066 0      00006 1      30075 0      67667 1      10000 0      12552 0   C: 77600 1
13,2530       12534 0      37642 0      26066 0      37665 0      50065 1      53401 1      30066 1      54047 0

13,2540       00006 1      77646 0      66165 0      04536 0   C: 02402 0   C: 26003 0      37646 1      00006 1
13,2550       05014 1      14602 0      50065 1      53401 1      37642 0      60066 1      54047 0      00006 1
13,2560       77646 0      67671 0      04536 0   C: 02566 0   C: 26003 0      12546 0      02643 1      30357 0
13,2570       54003 0      75235 1      54065 0      50065 1      11400 0      12601 0      37642 0      26047 0

13,2600       12540 0      50065 1      55400 0      37642 0      26047 0      12557 0      62527 0      00006 1
13,2610       62406 1      00006 1      42632 0      20075 1      30071 1      67647 0      00006 1      05014 1
13,2620       40074 0      54074 0      40075 1      76027 0      40000 0      56075 0      40000 0      12507 0
13,2630    C: 01700 1   C: 00000 1   C: 00034 0      00006 1      00011 1      77657 0      10000 0      12641 1

13,2640       12667 0      37665 0      12664 0      37652 1      70367 1      10000 0      12641 1      00002 0
13,2650       40367 1      77652 0      10000 0      24002 0      00002 0      40367 1      77652 0      10000 0
13,2660       00002 0      47665 1      54371 0      12033 1      54075 1      47665 1      12671 1      54075 1
13,2670       47657 0      54076 1      50075 0      10371 0      12676 0      12706 0      37665 0      50075 0

13,2700       56371 1      04422 1      40076 1      50071 1      26150 1      14602 0      30076 0      50075 0
13,2710       54371 0      14602 0      37656 0      12717 0      37657 1      02717 1      37665 0      00004 0
13,2720       54075 1      50000 1      10371 0      12741 0      12735 0      12731 1      50075 0      54371 0
13,2730       12033 1      10000 0      12741 0      24117 0      12726 1      04112 1      50075 0      54371 0

13,2740       14416 1      05446 1   C: 01210 0   C: 00014 1   C: 00050 1   C: 00070 0   C: 70000 0   C: 77500 1
13,2750    C: 77477 0   C: 00074 1   C: 21450 0      00004 0      54075 1      10374 0      02760 1      02763 1
13,2760       05413 1   C: 00105 0      04440 0      10431 0      02777 1      10505 0      02777 1      10561 1
13,2770       02777 1      10635 0      02777 1      10711 1      02777 1      05446 1   C: 01207 0      67656 0
```

OCTAL LISTING OF PARAGRAPH # 076, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
13,3000        54374 0       37665 0       54375 1       50374 1       53777 0       30075 0       26374 0       34530 0
13,3010        04363 0    C: 03022 1    C: 26003 0       02033 0       37665 0       56374 1       10000 0       50000 1
13,3020        54000 0       04076 1       37665 0       54375 1       37642 0       70374 0       10000 0       03036 1
13,3030        47645 0       70374 0       67645 1       54374 0       33355 1       03037 0       33431 1       05332 0

13,3040        05274 0       05140 1       03023 0       03023 0       37646 1       70374 0       10000 0       03051 0
13,3050        03055 1       37645 1       70374 0       10000 0       03063 1       05413 1    C: 00111 0       44516 0
13,3060        70374 0       54374 0       03022 1       47644 1       70374 0       67644 0       54374 0       33427 0
13,3070        05332 0       05140 1       03067 0       03067 0       46165 1       70375 1       10000 0       03067 0

13,3100        03103 0       03102 1       03067 0       36165 0       70375 1       10000 0       03110 1       03067 0
13,3110        37672 0       70374 0       54002 1       50375 0       31465 1       50002 0       54011 0       50375 0
13,3120        31462 0       50002 0       54010 1       37642 0       70374 0       10000 0       03146 1       03130 0
13,3130        33430 0       05332 0       05140 1       03130 0       03130 0       37672 0       70374 0       54002 1

13,3140        30336 1       50002 0       54003 0       30337 0       50002 0       54005 0       37672 0       70374 0
13,3150        54374 0       00004 0       37657 1       04536 0    C: 03157 1    C: 26003 0       04440 0       37657 1
13,3160        12667 0       54016 1       30033 1       54072 0       30034 0       54074 0       30032 0       54076 1
13,3170        00006 1       30025 0       52071 0       56002 0       54012 0       33425 1       00006 1       02016 1

13,3200        10000 0       03203 0       03233 0       37644 0       70374 0       10000 0       04606 0       10374 0
13,3210        03214 0       05413 1    C: 00112 0       04606 0       37653 0       00006 1       02016 1       10000 0
13,3220        03361 0       37654 1       00006 1       02016 1       10000 0       03251 1       37655 0       00006 1
13,3230        02016 1       10000 0       03245 1       33426 1       00006 1       02016 1       00006 1       13242 1

13,3240        04102 0    C: 22730 0       05413 1    C: 00113 1       04606 0       37665 0       54065 0       37646 1
13,3250        03254 1       37657 1       54065 0       37645 1       54375 1       70374 0       10000 0       03261 1
13,3260        03264 1       05413 1    C: 00114 0       03315 0       37672 0       70374 0       54066 0       00006 1
13,3270        30071 1       50066 1       52001 1       30066 1       26065 0       30072 1       50065 1       54002 1

13,3300        30074 1       50065 1       54004 1       30076 0       50065 1       54006 0       37643 1       60375 0
13,3310        40000 0       70374 0       60375 0       54374 0       03315 0       37665 0       54077 0       37645 1
13,3320        70374 0       10000 0       03325 0       37650 0       54077 0       37646 1       70374 0       10000 0
13,3330        03333 1       37651 1       26077 0       34530 0       04363 0    C: 03343 0    C: 26003 0       30077 1

13,3340        50071 1       54140 0       04606 0       10140 0       03347 1       33432 1       03351 0       33433 0
13,3350        60140 1       54107 0       30323 0       54150 1       05112 0    C: 05100 0       30150 0       54323 1
13,3360        04440 0       37642 0       70374 0       10000 0       03372 1       37646 1       70374 0       10000 0
13,3370        03414 0       03376 0       34504 1       70374 0       10000 0       03401 1       05413 1    C: 00115 1
```

OCTAL LISTING OF PARAGRAPH # 077, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
13,3400       03414 0       47643 0       70374 0       67643 1       56374 1       77643 0       10000 0       03414 0
13,3410       40375 1       70374 0       54374 0       03315 0       44504 0       70374 0       56374 1       77642 1
13,3420       10000 0       03315 0       37645 1       26374 0       03315 0    C: 00034 0    C: 00140 1    C; 02143 0
13,3430    C: 02442 1    C: 05300 1    C: 02130 1    C: 05000 1       03434 1       03435 0  CKSM 61247 1        @

13,3440        @             @             @             @             @             @             @             @
13,3450        @             @             @             @             @             @             @             @
13,3460        @             @             @             @             @             @             @             @
13,3470        @             @             @             @             @             @             @             @

13,3500        @             @             @             @             @             @             @             @
13,3510        @             @             @             @             @             @             @             @
13,3520        @             @             @             @             @             @             @             @
13,3530        @             @             @             @             @             @             @             @

13,3540        @             @             @             @             @             @             @             @
13,3550        @             @             @             @             @             @             @             @
13,3560        @             @             @             @             @             @             @             @
13,3570        @             @             @             @             @             @             @             @

13,3600        @             @             @             @             @             @             @             @
13,3610        @             @             @             @             @             @             @             @
13,3620        @             @             @             @             @             @             @             @
13,3630        @             @             @             @             @             @             @             @

13,3640        @             @             @             @             @             @             @             @
13,3650        @             @             @             @             @             @             @             @
13,3660        @             @             @             @             @             @             @             @
13,3670        @             @             @             @             @             @             @             @

13,3700        @             @             @             @             @             @             @             @
13,3710        @             @             @             @             @             @             @             @
13,3720        @             @             @             @             @             @             @             @
13,3730        @             @             @             @             @             @             @             @

13,3740        @             @             @             @             @             @             @             @
13,3750        @             @             @             @             @             @             @             @
13,3760        @             @             @             @             @             @             @             @
13,3770        @             @             @             @             @             @             @             @
```

```
OCTAL LISTING OF PARAGRAPH # 100, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

14,2000        37657 1      55512 1      04063 0   C: 26000 0      06000 1   I: 77634 0   C: 30530 1   I: 77634 0
14,2010     C: 30325 0   I: 47014 1   C: 00065 1   C: 30405 0   I: 77776 1      33655 1      05332 0      05140 1
14,2020        12745 1      12015 0      56333 1      55544 1      10334 1      12760 0      02576 1      02501 1
14,2030        02135 1      04063 0   C: 26716 0      12745 1      02247 1      02737 0      02727 1      04063 0

14,2040     C: 26227 1      04063 0   C: 26716 0      12745 1      02135 1      05401 1      02263 1      04063 0
14,2050     C: 30422 0      11512 1      12065 1      12047 1      12745 1      55512 1      00004 0      34517 0
14,2060        04374 0   C: 03062 0   C: 30005 1      00003 1      02047 0      05470 1      52141 1      00003 1
14,2070        37665 0      54037 1      54040 1      54041 0      55551 0      55537 0      02454 0      00004 0

14,2100        33666 1      04536 0   C: 02106 1   C: 30005 1      32134 0      04416 0      32134 0      04422 1
14,2110        04602 1      31542 0      55541 1      04063 0   C: 36771 0      00003 1      02454 0      31543 1
14,2120        55541 1      04063 0   C: 36771 0      00003 1      02454 0      00004 0      33665 1      04536 0
14,2130     C: 02106 1   C: 30005 1      32134 0      04416 0   C: 30111 0      00006 1      23546 1      04063 0

14,2140     C: 27014 1      37657 1      54333 0      33651 0      05332 0      37665 0      04063 0   C: 26753 1
14,2150        04063 0   C: 26714 1      12745 1      00006 1      50374 1      30001 0      53565 1      02242 1
14,2160        06000 1   I: 47140 1   C: 00374 1   C: 33051 0   I: 47014 1   C: 00305 1   C: 30170 1   C: 32517 0
14,2170     C: 01445 0   C: 01601 1   I: 77776 1      04063 0   C: 27014 1      37656 0      54333 0      33651 0

14,2200        05332 0      37665 0      04063 0   C: 26753 1      37646 1      70061 1      10000 0      12215 1
14,2210        04063 0   C: 30422 0      10372 0      12216 1      12210 1      12216 1      04063 0   C: 26714 1
14,2220        12745 1      02242 1      06000 1   I: 47140 1   C: 00374 1   C: 33051 0   I: 47014 1   C: 00205 0
14,2230     C: 30232 1   C: 32517 0   C: 01453 1   C: 01607 1   I: 77634 0   C: 30350 1   I: 77634 0   C: 32677 0

14,2240     I: 77776 1      01546 1      37656 0      60374 1      50104 1      54050 0      00002 0      00006 1
14,2250        23546 1      06000 1   I: 77634 0   C: 32615 1   I: 77776 1      04063 0   C: 26055 0      04063 0
14,2260     C: 26716 0      12745 1      01546 1      00006 1      23546 1      06000 1   I: 64375 1   C: 01401 0
14,2270     C: 01445 0   I: 43172 1   C: 00345 0   C: 30276 1   C: 36041 1   C: 32517 0   C: 23423 0   C: 01407 0

14,2300     I: 76521 0   C: 01445 0   I: 77614 1   C: 00345 0   C: 30307 0   C: 36041 1   C: 32517 0   C: 23431 0
14,2310     C: 01423 0   I: 76435 1   C: 01431 0   C: 37437 0   C: 32367 1   I: 45170 0   C: 02500 0   C: 33515 0
14,2320     I: 77776 1      04063 0   C: 26716 0      12745 1      01546 1   I: 77776 1      33660 1      55776 1
14,2330        33676 0      04063 0   C: 37236 1      37642 0      55400 0      06000 1   I: 73545 1   C: 01507 1

14,2340     C: 01411 1   C: 07421 1   C: 01507 1   I: 77746 1   C: 01413 0   I: 77676 0   C: 01417 1   I: 77616 0
14,2350     I: 77170 1   C: 00002 0   C: 00014 1   I: 77731 1   C: 00052 0   C: 00006 1   I: 60533 1   C: 01557 1
14,2360     C: 00001 0   I: 77756 0   C: 12023 0   C: 00001 0   I: 41546 0   I: 45133 1   C: 01556 0   C: 33345 0
14,2370     C: 00003 1   I: 41356 1   C: 00001 0   I: 77752 1   C: 12027 1   C: 00003 1   I: 41346 0   I: 57552 1
```

```
OCTAL LISTING OF PARAGRAPH # 101, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

14,2400     C: 04025 1   I: 61170 0   C: 00000 1   C: 30356 1   I: 77616 0   I: 65345 0   C: 33042 1   C: 01511 0
14,2410     I: 57546 1   I: 73525 1   C: 01511 0   I: 74266 0   C: 31702 0   C: 01514 0   I: 77624 1   C: 33342 1
14,2420     C: 01565 0   I: 77616 0      04112 1      55547 1      06000 1   I: 77624 1   C: 33342 1   C: 01562 1
14,2430     I: 54225 0   C: 01565 0   C: 00212 0   I: 64361 1   C: 01514 0   C: 01401 0   I: 77655 1   C: 01772 1

14,2440     C: 07772 1   C: 01562 1   C: 01565 0   I: 45170 0   C: 02771 1   C: 33515 0   I: 77776 1      04063 0
14,2450     C: 26716 0      12745 1      31547 0      14105 0      00006 1      23546 1      06000 1   I: 54340 1
14,2460     C: 01537 1   C: 00204 1   I: 45005 0   C: 31700 1   C: 33406 0   C: 03571 1   I: 77776 1      57551 1
14,2470        51537 1      55572 1      41537 0      63664 0      00006 1      63123 1      36165 0      27537 0

14,2500        01546 1      00006 1      23546 1      37657 1      22007 0      23550 0      54335 0      33652 0
14,2510        05332 0      51550 0      53554 0      52334 1      02554 1   C: 00661 0      12745 1      52334 1
14,2520        51550 0      53554 0      11550 1      12527 1      37656 0      54001 1      12505 1      01546 1
14,2530     I: 62545 1   C: 01511 0   C: 06335 1   C: 01507 1   I: 77424 0   C: 33410 1      56140 1      54333 0

14,2540        02554 1   C: 00661 0      12745 1      06000 1   I: 45135 1   C: 00334 0   C: 33345 0   C: 01507 1
14,2550     I: 60535 1   C: 00335 1   C: 01511 0   I: 77616 0      00006 1      23545 1      51545 1      30000 1
14,2560        05107 1      12573 0      05274 0      05140 1      12567 0      12571 1      12556 1      51545 1
14,2570        00001 0      51545 1      00002 0      32575 1      05327 1   C: 30556 1      00006 1      23546 1

14,2600        51544 0      12602 0      12745 1      12610 0      12615 0      12633 1      12654 0      12706 0
14,2610        37657 1      55542 1      37656 0      55543 0      01546 1      06000 1   I: 57575 1   C: 01401 0
14,2620     I: 77715 1   C: 01415 0   C: 23401 0   I: 77626 0   C: 76362 1   I: 77776 1      37665 0      55542 1
14,2630        37657 1      55543 0      01546 1      06000 1   I: 63375 0   C: 01401 0   C: 01407 0   I: 77715 1

14,2640     C: 01415 0   C: 23401 0   I: 77626 0   C: 54362 1   I: 77626 0   C: 76370 1   I: 77776 1      37665 0
14,2650        55542 1      37656 0      55543 0      01546 1      37653 0      60104 1      50104 1      54050 0
14,2660        33656 1      05332 0      05140 1      12745 1      12660 1      30400 0      50104 1      54024 0
14,2670        30401 1      50104 1      54020 1      30402 1      50104 1      54022 0      06000 1   I: 47024 1

14,2700     C: 32766 1   C: 33000 1   I: 77624 1   C: 32766 1   I: 77776 1      01546 1      31546 1      55551 0
14,2710        02501 1      06000 1   I: 77634 0   C: 30350 1   I: 41575 0   C: 00007 0   C: 01407 0   I: 76435 1
14,2720     C: 00015 0   C: 01401 0   I: 76435 1   I: 77626 0   C: 76362 1   I: 77776 1      01551 1      00006 1
14,2730        23546 1      06000 1   I: 77775 1   C: 33042 1   C: 01772 1   I: 77776 1      01546 1      37652 1

14,2740        70322 0      00006 1      12744 0      12745 1      00002 0      37650 0      67651 1      40000 0
14,2750        00004 0      70061 1      54061 1      04667 1   C: 00000 1      04063 0   C: 27014 1      04437 0
14,2760        06000 1   I: 57575 1   C: 33036 1   C: 01437 0   C: 23461 0   C: 33040 0   C: 01423 0   C: 23445 0
14,2770     C: 33034 0   C: 01431 0   C: 01453 1   I: 77776 1      41544 1      66165 0      00006 1      13001 1
```

OCTAL LISTING OF PARAGRAPH # 102, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
14,3000        13014 0      06000 1   I: 57575 1   C: 01423 0   I: 77715 1   C: 01437 0   C: 01423 0   C: 23445 0
14,3010     I: 77626 0   C: 76340 1   C: 01461 0   I: 77776 1      04063 0   C: 26716 0      12745 1      02576 1
14,3020        05401 1      02247 1      02737 0      04063 0   C: 26227 1      04063 0   C: 26716 0      12745 1
14,3030        30032 0      50104 1      54024 0      30033 1      50104 1      54020 1      30034 0      50104 1

14,3040        54022 0      37653 0      60104 1      50104 1      54050 0      02263 1      06000 1   I: 77624 1
14,3050     C: 33342 1   C: 01565 0   I: 77776 1      41512 1      67656 0      00006 1      13060 0      12051 0
14,3060        04063 0   C: 35235 0      33674 1      55546 0      04063 0   C: 20247 1      04063 0   C: 23001 1
14,3070        12524 1      04063 0   C: 26712 1      14440 1      06000 1   I: 77170 1   C: 00000 1   C: 00006 1

14,3100     I: 77634 0   C: 30353 1   I: 64375 1   C: 00015 0   C: 01401 0   I: 77772 0   C: 36416 1   C: 20306 0
14,3110        13115 0      04063 0   C: 26712 1      14440 1      14440 1      05413 1   C: 00524 1      14440 1
14,3120        47665 1      55512 1      12002 0      05317 1      37665 0      55537 0      51537 1      41674 1
14,3130        51537 1      27702 1      33662 0      61537 1      10000 0      46165 1      27537 0      13126 0

14,3140        55537 0      06000 1   I: 70750 1   C: 01537 1   C: 01701 0   I: 77625 0   C: 01571 0   C: 03701 1
14,3150     I: 77776 1      41537 0      63663 1      10000 0      36165 0      27537 0      13141 1      55550 1
14,3160        36165 0      55537 0      06000 1   I: 77775 1   C: 33042 1   C: 00031 0   C: 00037 0   I: 77735 0
14,3170     C: 31660 0   C: 00041 1   I: 77776 1      06000 1   I: 70750 1   C: 01537 1   C: 01701 0   I: 41423 1

14,3200     C: 01673 1   I: 42742 0   C: 01673 1   C: 03701 1   I: 43312 0   C: 00031 0   C: 14031 0   C: 01701 0
14,3210     I: 63412 0   I: 77615 0   C: 00033 1   C: 00033 1   I: 77776 1      31550 0      61537 1      40000 0
14,3220        63662 0      10000 0      36162 1      27537 0      13173 0      61550 0      55537 0      06000 1
14,3230     I: 66740 1   C: 01537 1   C: 01604 1   C: 00043 0   I: 77745 1   I: 54206 1   C: 00211 0   I: 43265 1

14,3240     C: 00043 0   C: 00035 1   C: 06035 1   I: 55261 1   C: 00207 1   C: 00043 0   I: 42523 0   C: 01602 1
14,3250     I: 77605 1   I: 77615 0   C: 00037 0   C: 00037 0   I: 77776 1      41537 0      63661 0      61550 0
14,3260        10000 0      36162 1      27537 0      13227 1      06000 1   I: 41345 0   C: 00031 0   C: 00037 0
14,3270     I: 41325 0   C: 00033 1   C: 00035 1   I: 77625 0   I: 63525 0   C: 00031 0   I: 65342 1   C: 00041 1

14,3300     I: 41261 1   C: 00212 0   C: 00033 1   I: 55225 1   I: 54205 1   C: 31673 1   C: 00204 1   C: 00337 0
14,3310     I: 77776 1      31544 0      54340 1      33654 0      05332 0      05274 0      05140 1      12745 1
14,3320        36165 0      55550 1      37665 0      13161 0      37637 1      55576 0      37665 0      55577 1
14,3330        55575 0      03333 1      25577 0      51577 0      33336 1      14067 0   C: 31352 1   C: 31370 1

14,3340     C: 31376 1   C: 31410 0   C: 31422 1   C: 31447 1   C: 31524 0   C: 31551 1   C: 30745 1   C: 31454 0
14,3350     C: 31527 0   C: 31554 1      37664 1      54333 0      35235 0      54334 1      00006 1      51575 1
14,3360        01005 0      33643 0      05332 0      33650 1      05332 0      05140 1      02745 0      03332 0
14,3370        25575 1      24333 1      37665 0      00006 1      01005 0      03354 0      37662 1      54333 0
```

OCTAL LISTING OF PARAGRAPH # 103, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
14,3400      37700 1      54334 1      00006 1      05011 1      37665 0      00006 1      01006 0      03361 0
14,3410      37661 1      54333 0      47700 0      00006 1      03011 1      33646 0      54334 1      00006 1
14,3420      05012 1      03361 0      43646 1      00006 1      03012 1      37665 0      54333 0      54334 1
14,3430      55575 0      37657 1      55576 0      00004 0      04536 0   C: 03460 0   C: 30005 1      00003 1

14,3440      33650 1      05332 0      05140 1      02745 0      37665 0      55576 0      03332 0      37665 0
14,3450      54055 0      33347 1      55574 1      04416 0      37637 1      55575 0      37651 1      03433 0
14,3460      11576 0      03466 0      31574 0      55576 0      04422 1      04602 1      11575 0      03502 0
14,3470      35234 1      54055 0      37654 1      00006 1      05014 1      37652 1      04536 0   C; 03460 0

14,3500   C: 30005 1      04602 1      45234 0      03471 0      11576 0      03512 1      31574 0      55576 0
14,3510      04422 1      04602 1      33644 1      54060 0      37655 0      00006 1      05014 1      37652 1
14,3520      04536 0   C: 03504 0   C: 30005 1      04602 1      33350 1      55574 1      04416 0      37665 0
14,3530      55575 0      47654 0      00006 1      03014 1      00004 0      37657 1      04536 0   C: 03504 0

14,3540   C: 30005 1      00003 1      33650 1      05332 0      05140 1      02745 0      37665 0      55576 0
14,3550      03332 0      33351 0      55574 1      04416 0      37657 1      55575 0      37656 0      00006 1
14,3560      05014 1      03534 0      06000 1   I: 77414 0   C: 00065 1      02135 1      06000 1   I; 47375 0
14,3570   C: 01601 1   C; 01607 1   I: 77646 0   C: 22023 0   C: 01601 1   I: 77641 1   C: 01607 1   C: 36021 1

14,3600   C: 32440 0   I: 77624 1   C: 33410 1   C: 00025 0   I: 77776 1      33675 0      60104 1      54142 1
14,3610      33653 1      05332 0      12745 1      00004 0      37665 0      54026 1      33642 1      54003 0
14,3620      22007 0      50000 1      23401 0      67656 0      26003 0      75235 1      10000 0      13620 1
14,3630      10003 0      13634 1      04102 0   C; 24000 1      00003 1      37665 0      54350 0      00004 0

14,3640      47657 0      13620 1   C: 00027 1   C: 00430 0   C: 52525 1   C: 70707 0   C: 37400 1   C: 00130 0
14,3650   C: 03300 1   C: 00130 0   C: 00530 1   C: 00603 1   C: 00666 1   C: 02430 1   C: 02522 0   C: 00013 0
14,3660   C: 00021 1   C: 00074 1   C: 00077 1   C: 00105 0   C: 00110 1   C: 05670 0   C: 13560 0   C: 01500 0
14,3670   C: 01570 1   C: 02570 1   C: 00322 1   C: 14366 1   C: 03071 1   C: 00024 1   C; 01400 1   C: 24365 1

14,3700   C: 30244 0   C; 07623 1   C: 26552 1      04063 0   C: 26716 0      12745 1      02727 1      06000 1
14,3710   I: 77634 0   C; 30405 0   I: 77776 1      31617 0      67670 1      55616 0      00006 1      13722 1
14,3720      37656 0      03723 1      37657 1      55672 1      04063 0   C: 36545 0      03726 1      03727 0
14,3730 CKSM 76260 1        @            @            @            @            @            @            @

14,3740        @            @            @            @            @            @            @            @
14,3750        @            @            @            @            @            @            @            @
14,3760        @            @            @            @            @            @            @            @
14,3770        @            @            @            @            @            @            @            @
```

OCTAL LISTING OF PARAGRAPH # 104, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
15,2000    C: 00437 1   C: 00342 1   C: 00025 0   C: 00024 1   C: 00412 0   C: 03602 0   C: 03601 0   C: 03600 1
15,2010    C: 03577 1   C: 00412 0   C: 03576 0   C: 03575 0   C: 03574 1   C: 03573 0   C: 00412 0   C: 03572 1
15,2020    C: 03571 1   C: 03570 0   C: 03567 0   C: 00412 0   C: 03566 1   C: 03565 1   C: 03564 0   C: 03563 1
15,2030    C: 00412 0   C: 03562 0   C: 03561 0   C: 01560 0   C: 01557 1   C: 00412 0   C: 01556 0   C: 01555 0

15,2040    C: 01554 1   C: 01553 0   C: 00412 0   C: 01552 1   C: 01551 1   C: 01550 0   C: 01547 0      54016 1
15,2050       51401 0      10000 0      30411 0      55400 0      76426 0      00006 1      01034 1      47651 0
15,2060       00006 1      03013 0      32212 1      55401 1      32000 0      12151 1      37651 1      00006 1
15,2070       05013 0      37665 0      54065 0      37661 1      54066 0      61400 1      00006 1      50000 1

15,2100       50032 0      30001 0      50065 1      53404 1      37656 0      26065 0      10066 0      12074 1
15,2110       32220 0      55402 1      32213 0      55401 1      00006 1      51400 1      50045 0      30001 0
15,2120       12146 1      55402 1      00006 1      50000 1      52230 1      30001 0      12146 1      11402 1
15,2130       12121 0      32214 1      55401 1      32217 1      55402 1      61400 1      00006 1      50000 1

15,2140       30001 0      54003 0      75235 1      00006 1      50000 1      31401 0      00006 1      01034 1
15,2150       30001 0      00006 1      01035 0      14610 0      11402 1      12134 1      32215 0      55401 1
15,2160       36162 1      55402 1      00006 1      50000 1      52221 1      30001 0      12146 1      11402 1
15,2170       12161 1      32216 0      55401 1      36165 0      55402 1      00006 1      50000 1      52247 1

15,2200       00000 1      54001 1      00006 1      51402 0      52243 0      00000 1      12146 1      11402 1
15,2210       12174 0      12052 0   C: 02066 0   C: 02127 1   C: 02154 0   C: 02167 0   C: 02207 0   C: 00031 0
15,2220    C: 00013 0   C: 00024 1   C: 00321 1   C: 00317 1   C: 00315 0   C: 00313 0   C: 00311 1   C: 00307 0
15,2230    C: 01427 1   C: 01425 0   C: 01423 0   C: 01421 1   C: 01417 1   C: 01415 0   C: 01413 0   C: 01411 1

15,2240    C: 01407 0   C: 01405 1   C: 01403 1   C: 00032 0   C: 00030 1   C: 00013 0   C: 00011 1   C: 00033 1
15,2250    C: 00031 0   C: 00014 1   C: 00012 1   C: 00342 1   C: 03436 0   C: 03545 0   C: 03543 0   C: 03541 1
15,2260    C: 03537 0   C: 03535 1   C: 03533 1   C: 03531 0   C: 03527 1   C: 03525 0   C: 03523 0   C: 03521 1
15,2270    C: 03517 1   C: 03515 0   C: 03513 0   C: 03511 1   C: 03507 0   C: 03505 1   C: 03503 1   C: 03501 0

15,2300    C: 03477 0   C: 03475 1   C: 03473 1   C: 03471 0   C: 03467 1   C: 01465 1   C: 01463 1   C: 01461 0
15,2310    C: 01457 0   C: 01455 1   C: 01453 1   C: 01451 0   C: 01447 1   C: 01445 0   C: 01443 0   C: 01441 1
15,2320    C: 01437 0   C: 00342 1   C: 02634 1   C: 02632 1   C: 02630 0   C: 02626 1   C: 02650 0   C: 02644 0
15,2330    C: 02634 1   C: 02632 1   C: 02626 1   C: 02624 0   C: 02576 1   C: 02640 1   C: 02636 0   C: 00374 1

15,2340    C: 00402 1   C: 00400 0   C: 00423 1   C: 00362 0   C: 00366 1   C: 01362 1   C: 00063 1   C: 00061 0
15,2350    C: 00035 1   C: 00034 0   C: 00032 0   C: 00360 1   C: 00355 1   C: 00364 0   C: 00354 0   C: 00352 0
15,2360    C: 00421 0   C: 00417 0   C: 00415 1   C: 00427 0   C: 00413 1   C: 00041 1   C: 00037 0   I: 71230 0
15,2370    C: 00051 0   C: 01423 0   I: 65325 0   C: 33042 1   C: 01427 1   I: 55476 1   I: 77656 1   C: 06027 1
```

OCTAL LISTING OF PARAGRAPH # 105, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
15,2400    C: 00027 1    I: 77742 0    C: 06023 0    C: 00033 1    I: 77742 0    C: 36021 1    C: 32440 0    C: 07503 0
15,2410    C: 01425 0    I: 77742 0    C: 06023 0    C: 00027 1    I: 65205 0    C: 01427 1    C: 00033 1    I: 45205 1
15,2420    C: 01423 0    I: 77626 0    C: 41756 0    C: 32440 0    C: 23505 0    C: 00027 1    I: 77641 1    C: 01437 0
15,2430    C: 22021 1    C: 00027 1    I: 77641 1    C: 01431 0    C: 36023 0    C: 32440 0    C: 37501 1    C: 00051 0

15,2440    I: 51545 1    C: 00023 0    I: 50025 0    C: 33030 1    C: 32453 1    I: 72545 0    C: 00021 1    I: 75326 1
15,2450    C: 00023 0    C: 00025 0    I: 77616 0    I: 72545 0    C: 00023 0    I: 77736 0    C: 06025 0    C: 00021 1
15,2460    I: 77640 0    C: 32464 0    I: 43545 1    C: 00025 0    I: 75345 1    C: 33032 0    C: 00023 0    I: 77625 0
15,2470    C: 00025 0    C: 00025 0    I: 77616 0    I: 43030 0    C: 00051 0    C: 00264 1    I: 77170 1    C: 00004 0

15,2500    C: 00000 1    I: 77634 0    C: 32543 1    I: 77170 1    C: 00002 0    C: 00004 0    I: 77634 0    C: 32543 1
15,2510    I: 77170 1    C: 00000 1    C: 00002 0    I: 77634 0    C: 32543 1    I: 77650 1    C: 00051 0    I: 43030 0
15,2520    C: 00051 0    C: 00064 0    I: 77170 1    C: 00000 1    C: 00002 0    I: 77634 0    C: 32543 1    I: 77170 1
15,2530    C: 00002 0    C: 00004 0    I: 77634 0    C: 32543 1    I: 77170 1    C: 00004 0    C: 00000 1    I: 77634 0

15,2540    C: 32543 1    I: 77650 1    C: 00051 0    I: 66660 1    C: 00050 1    C: 00005 1    I: 56024 1    C: 33345 0
15,2550    C: 00050 1    C: 00037 0    I: 77746 1    C: 10011 0    C: 00037 0    I: 77756 0    C: 02013 1    I: 72403 0
15,2560    C: 77732 1    I: 40723 0    C: 00011 1    C: 77732 1    I: 64752 0    C: 00013 0    I: 72403 0    C: 00045 0
15,2570    I: 77614 1    C: 00344 1    C: 32604 1    I: 45421 1    C: 57732 0    C: 00011 1    I: 72403 0    C: 00045 0

15,2600    I: 45415 0    C: 53732 1    C: 00041 1    I: 77616 0    I: 45415 0    C: 57732 0    C: 00011 1    I: 72403 0
15,2610    C: 00045 0    I: 45425 0    C: 53732 1    C: 00041 1    I: 77616 0    I: 47375 0    C: 01423 0    C: 01407 0
15,2620    I: 41456 0    I: 46041 0    C: 01437 0    C: 00051 0    C: 22021 1    C: 00001 0    I: 77641 1    C: 01431 0
15,2630    C: 36023 0    C: 32440 0    C: 23501 1    C: 00001 0    I: 50235 0    C: 01423 0    C: 01407 0    I: 77752 1

15,2640    C: 22021 1    C: 01407 0    I: 77641 1    C: 01423 0    C: 36023 0    C: 32440 0    C: 01505 0    I: 45246 0
15,2650    C: 33050 1    I: 77644 1    C: 32671 0    I: 50375 0    C: 01415 0    C: 00001 0    C: 22021 1    C: 01401 0
15,2660    I: 45441 1    C: 41754 1    C: 32440 0    C: 23503 0    C: 01501 1    I: 77624 1    C: 33414 0    C: 36401 1
15,2670    C: 00051 0    I: 77776 1       05413 1    C: 00401 1       06000 1    I: 77650 1    C: 32653 0    I: 66370 0

15,2700    C: 01452 0    C: 00051 0    C: 01436 1    I: 46773 0    C: 01461 0    C: 01467 0    I: 77656 1    C: 33467 1
15,2710    C: 01461 0    I: 76433 1    C: 01467 0    C: 03475 1    I: 77700 0    C: 32703 1    I: 66160 0    C: 00006 1
15,2720    C: 00036 1    I: 66370 0    C: 00022 1    C: 00051 0    C: 00006 1    I: 66374 1    C: 00006 1    C: 00052 0
15,2730    C: 00002 0    I: 76720 0    C: 00036 1    C: 00001 0    I: 62757 0    C: 76324 0    C: 00007 0    I: 77757 1

15,2740    C: 76316 1    C: 30031 0    C: 00015 0    I: 53357 0    C: 76310 1    I: 76455 1    C: 00031 0    I: 77720 1
15,2750    C: 00036 1    C: 03445 1    I: 77700 0    C: 32754 0    I: 77704 1    C: 32731 0    I: 77775 1    C: 01423 0
15,2760    C: 23445 0    C: 01431 0    C: 23453 1    C: 01437 0    C: 01461 0    I: 77616 0       53447 0       53453 0
15,2770       53447 0       53451 1       53461 1       53451 1       53457 1       53463 0       53457 1       16014 0
```

OCTAL LISTING OF PARAGRAPH # 106, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
15,3000     I: 77230 0   C: 00014 1   C: 33040 0   C: 36041 1   C: 32473 0   I: 76521 0   C: 01445 0   C: 23401 0
15,3010     C: 33036 1   C: 36041 1   C: 32473 0   I: 76521 0   C: 01445 0   C: 23407 0   C: 33034 0   C: 36041 1
15,3020     C: 32473 0   I: 76521 0   C: 01445 0   C: 37415 0   C: 00014 1   C: 67777 1   C: 77777 0   C: 05520 0
15,3030     C: 26075 1   C: 20000 0   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 20000 0

15,3040     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 05252 1
15,3050     C: 25253 1   I: 66601 0   C: 00001 0   C: 00004 0   I: 41424 0   C: 33345 0   C: 00017 1   I: 65346 0
15,3060     I: 41556 1   I: 45133 1   C: 00006 1   C: 33345 0   C: 00021 1   I: 52054 1   C: 33070 0   C: 33100 0
15,3070     I: 53145 1   C: 00017 1   C: 33075 0   I: 77650 1   C: 33100 0   I: 52145 0   C: 33042 1   C: 33105 0

15,3100     I: 45345 1   C: 00017 1   C: 00021 1   I: 77621 1   C: 33172 0   I: 41405 0   C: 33170 1   I: 65346 0
15,3110     I: 41556 1   I: 72405 0   C: 00001 0   C: 06001 0   C: 00003 1   I: 45405 1   C: 77774 0   I: 45133 1
15,3120     C: 00012 1   C: 33345 0   I: 73406 1   I: 71525 0   I: 41206 0   C: 00001 0   I: 41325 0   C: 00005 1
15,3130     C: 00007 0   I: 72415 1   I: 77626 0   C: 71736 0   I: 77605 1   C: 00005 1   C: 06005 1   I: 44205 0

15,3140     C: 00001 0   I: 66606 1   C: 00011 1   I: 41424 0   C: 33345 0   I: 65346 0   I: 77756 0   C: 00001 0
15,3150     I: 65205 0   C: 00005 1   C: 00007 0   I: 43205 1   C: 00003 1   I: 77712 0   C: 06043 0   I: 45405 1
15,3160     C: 71732 1   I: 77605 1   I: 62421 1   C: 00045 0   C: 22045 0   C: 00041 1   I: 77616 0   C: 02525 1
15,3170     C: 12525 0   C: 37777 1   C: 37777 1   I: 77630 1   C: 00035 1   I: 70001 1   C: 00015 0   C: 00050 1

15,3200     I: 41545 0   C: 33042 1   I: 45133 1   C: 00007 0   C: 33345 0   I: 71406 0   I: 73525 1   I: 41476 1
15,3210     I: 45133 1   C: 00010 0   C: 33345 0   I: 71406 0   C: 06041 1   I: 41556 1   I: 72405 0   C: 00021 1
15,3220     C: 06043 0   I: 57405 1   C: 00017 1   I: 77752 1   C: 36045 0   C: 32517 0   I: 45515 1   C: 77736 0
15,3230     I: 62120 0   C: 00050 1   C: 00001 0   I: 47120 1   C: 00050 1   C: 32517 0   I: 76435 1   I: 77676 0

15,3240     C: 00041 1   I: 77650 1   C: 00035 1   I: 45135 1   C: 00424 0   C: 33345 0   I: 41401 1   C: 00001 0
15,3250     I: 57556 0   C: 06043 0   I: 41546 0   I: 45135 1   C: 00425 1   C: 33345 0   I: 71406 0   I: 72405 0
15,3260     C: 00001 0   C: 06045 0   I: 41356 1   I: 77752 1   C: 22041 1   C: 00041 1   I: 77616 0   I: 57545 1
15,3270     C: 00043 0   I: 67401 0   C: 00001 0   I: 44206 0   C: 33032 0   C: 06005 1   C: 33042 1   C: 22043 0

15,3300     C: 00041 1   I: 41056 1   C: 20346 1   C: 06041 1   C: 00041 1   I: 46142 1   C: 00051 0   C: 06023 0
15,3310     C: 00045 0   I: 77742 0   C: 36021 1   C: 32440 0   I: 43206 1   C: 33032 0   C: 22007 0   C: 00005 1
15,3320     I: 77624 1   C: 33431 1   C: 22426 1   C: 00001 0   I: 77624 1   C: 33431 1   C: 00424 0   I: 77776 1
15,3330        40413 0      77644 1      10000 0      13337 1      52424 1      52426 0      52424 1      06000 1

15,3340     I: 77650 1   C: 00051 0      00006 1      30025 0      16470 0      10140 0      37665 0      13352 1
15,3350        13351 1      47642 1      54141 1      37665 0      56140 1      00006 1      77642 1      20141 1
15,3360        16472 1      00004 0      30033 1      54140 0      30034 0      54143 0      30032 0      13376 1
15,3370        00004 0      30037 0      54140 0      30040 0      54143 0      30041 1      00003 1      54145 0
```

```
OCTAL LISTING OF PARAGRAPH # 107, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

15,3400      37665 0      54141 1      54144 1      54146 0      47657 0      16013 1      07235 1      16014 0
15,3410      03440 1      37665 0      54141 1      16013 1      03440 1      52146 0      52141 1      03440 1
15,3420      54142 1      52144 1      52141 1      03440 1      54141 1      30145 1      54140 0      37657 1
15,3430      16013 1      03440 1      52144 1      52141 1      03440 1      54001 1      30143 1      16470 0

15,3440      52141 1      20001 1      10000 0      67657 1      13446 0      40000 0      54140 0      00002 0
15,3450      50000 1      37640 1      26140 0      00002 0      33467 1      54114 1      30140 1      03470 1
15,3460      24114 0      30143 1      03470 1      24114 0      30145 1      03470 1      13404 0   C: 00400 0
15,3470      54126 0      50114 0      10000 0      67657 1      13500 0      67657 1      67657 1      40000 0

15,3500      60126 1      10000 0      67657 1      13505 0      40000 0      54126 0      13512 0      50000 1
15,3510      37640 1      60126 1      50114 0      54000 0      00002 0      50104 1      30046 0      04063 0
15,3520   C: 26317 0      16014 0      04554 1   C: 00062 0      37656 0      00006 1      02012 0      00006 1
15,3530      13522 0      30126 1      54074 0      33573 0      56114 0      54075 1      30362 0      60000 1

15,3540      00006 1      73574 0      03470 1      24114 0      30035 1      00006 1      20007 1      04232 0
15,3550      00006 1      77642 1      10000 0      13556 0      13556 0      13556 0      67657 1      54065 0
15,3560      30363 1      00006 1      73574 0      00006 1      10065 0      03470 1      30074 1      54126 0
15,3570      30075 0      54114 1      13522 0   C: 00035 1   C: 22755 0      03575 0      03576 0 CKSM 50366 1

15,3600         @            @            @            @            @            @            @            @
15,3610         @            @            @            @            @            @            @            @
15,3620         @            @            @            @            @            @            @            @
15,3630         @            @            @            @            @            @            @            @

15,3640         @            @            @            @            @            @            @            @
15,3650         @            @            @            @            @            @            @            @
15,3660         @            @            @            @            @            @            @            @
15,3670         @            @            @            @            @            @            @            @

15,3700         @            @            @            @            @            @            @            @
15,3710         @            @            @            @            @            @            @            @
15,3720         @            @            @            @            @            @            @            @
15,3730         @            @            @            @            @            @            @            @

15,3740         @            @            @            @            @            @            @            @
15,3750         @            @            @            @            @            @            @            @
15,3760         @            @            @            @            @            @            @            @
15,3770         @            @            @            @            @            @            @            @
```

OCTAL LISTING OF PARAGRAPH # 110, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
16,2000      52136 1     50267 1     32052 1     54132 0     50267 1     32152 0     54133 1     40267 0
16,2010      62036 0     00006 1     62016 1     37657 1     54124 1     02034 1     37656 0     54124 1
16,2020      50267 1     32420 0     54137 0     36426 1     70132 0     54002 1     50000 1     32406 1
16,2030      54134 0     00006 1     50002 0     32410 0     52136 1     52006 0  C: 00055 1     52110 0

16,2040      00006 1     50000 1     32331 1     52110 0     52006 0     52110 0     00006 1     50000 1
16,2050      32253 1     12043 0  C: 00000 1  C: 40000 0  C: 40000 0  C: 40000 0  C: 40000 0  C: 40000 0
16,2060   C: 40000 0  C: 00000 1  C: 77776 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 77777 0
16,2070   C: 00024 1  C: 00024 1  C: 00032 0  C: 00037 0  C: 00400 0  C: 00336 1  C: 00333 1  C: 00333 1

16,2100   C: 00333 1  C: 01361 1  C: 00333 1  C: 01363 0  C: 02166 1  C: 02046 1  C: 02174 1  C: 00333 1
16,2110   C: 01474 1  C: 01477 1  C: 00035 1  C: 00423 1  C: 00336 1  C: 00375 0  C: 00360 1  C: 03035 1
16,2120   C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 01440 0  C: 01443 0  C: 01446 0  C: 02000 0
16,2130   C: 02002 1  C: 02004 1  C: 02006 0  C: 02010 1  C: 04012 0  C: 04015 1  C: 04020 1  C: 02023 1

16,2140   C: 04025 1  C: 04030 0  C: 02033 0  C: 02035 0  C: 04037 1  C: 04042 0  C: 04045 1  C: 04050 0
16,2150   C: 04053 0  C: 04056 0  C: 00000 1  C: 00040 0  C: 00140 1  C: 00102 1  C: 00241 0  C: 00200 0
16,2160   C: 00343 0  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1
16,2170   C: 00200 0  C: 00241 0  C: 04102 0  C: 04140 0  C: 04102 0  C: 04102 0  C: 00200 0  C: 00140 1

16,2200   C: 04000 0  C: 00140 1  C: 04140 0  C: 04000 0  C: 00252 1  C: 00252 1  C: 00350 1  C: 04000 0
16,2210   C: 04000 0  C: 04000 0  C: 02102 0  C: 02102 0  C: 02102 0  C: 00140 1  C: 02161 0  C: 04162 0
16,2220   C: 00000 1  C: 00000 1  C: 00000 1  C: 00000 1  C: 04144 1  C: 04145 0  C: 04145 0  C: 00016 0
16,2230   C: 00023 0  C: 00024 1  C: 00025 0  C: 00542 1  C: 04114 1  C: 04115 0  C: 40757 0  C: 00001 0

16,2240   C: 00000 1  C: 06143 1  C: 00126 1  C: 00126 1  C: 20410 0  C: 22451 1  C: 00412 0  C: 20450 1
16,2250   C: 20410 0  C: 22451 1  C: 00006 1  C: 03240 1  C: 00253 0  C: 25124 1  C: 00000 1  C: 00000 1
16,2260   C: 10707 0  C: 03435 0  C: 00001 0  C: 02133 1  C: 00011 1  C: 30322 1  C: 00004 0  C: 14021 1
16,2270   C: 00314 1  C: 31463 1  C: 23420 0  C: 00000 1  C: 00201 1  C: 30327 1  C: 01371 0  C: 34750 1

16,2300   C: 00001 0  C: 03434 1  C: 00006 1  C: 20162 0  C: 00011 1  C: 27066 1  C: 00016 0  C: 04245 0
16,2310   C: 00002 0  C: 23224 1  C: 00014 1  C: 06500 1  C: 00012 1  C: 36455 0  C: 04256 1  C: 07071 0
16,2320   C: 77766 0  C: 60044 1  C: 00004 0  C: 34055 0  C: 00007 0  C: 04147 1  C: 00005 1  C: 21616 0
16,2330   C: 05174 0  C: 13261 0  C: 27670 0  C: 31357 1  C: 00000 1  C: 00000 1  C: 00714 0  C: 31463 1

16,2340   C: 35753 0  C: 32323 1  C: 03216 1  C: 06400 0  C: 07237 0  C: 37776 0  C: 00120 1  C: 00000 1
16,2350   C: 00321 1  C: 26706 1  C: 37441 1  C: 14247 0  C: 05300 1  C: 20305 0  C: 34631 1  C: 23146 0
16,2360   C: 04725 0  C: 35454 1  C: 03225 1  C: 07470 0  C: 02207 0  C: 03255 0  C: 14226 1  C: 31757 0
16,2370   C: 02476 0  C: 05531 0  C: 02727 1  C: 16415 0  C: 00007 0  C: 13734 0  C: 74502 0  C: 76401 0
```

```
OCTAL LISTING OF PARAGRAPH # 111, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

16,2400     C: 06436 0    C: 35664 0    C: 04371 0    C: 17420 1    C: 05605 1    C: 03656 1    C: 03461 1    C: 03465 0
16,2410     C: 03437 1    C: 03443 1    C: 03445 1    C: 03451 1    C: 03453 0    C: 03457 1    C: 00333 1    C: 00334 0
16,2420     C: 03437 1    C: 03441 0    C: 03442 0    C: 03445 1    C: 03447 0    C: 03450 0    C: 00352 0    C: 00355 1
16,2430     C: 00354 0    C: 00013 0    C: 00013 0    C: 00336 1    C: 00337 0    C: 00340 0    C: 00403 0    C: 00405 0

16,2440     C: 00407 1    C: 01471 1    C: 01471 1    C: 01471 1    C: 01471 1    C: 02052 1    C: 02054 1    C: 02056 0
16,2450     C: 02060 0    C: 02062 1    C: 02064 1    C: 02166 1    C: 02174 1    C: 02200 1    C: 00333 1    C: 00335 1
16,2460     C: 02176 0    C: 00333 1    C: 00335 1    C: 00337 0    C: 00333 1    C: 00335 1    C: 00337 0    C: 00000 1
16,2470     C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00204 1    C: 00204 1    C: 00204 1

16,2500     C: 00204 1    C: 00142 0    C: 04104 0    C: 04104 0    C: 06204 1    C: 00205 0    C: 06043 0    C: 16347 0
16,2510     C: 00104 1    C: 00104 1    C: 16347 0    C: 12245 1    C: 06345 0    C: 16247 1    C: 16347 0    C: 12245 1
16,2520        00006 1       23546 1       11614 1       37647 0       02526 1       02530 0       00006 1       05014 1
16,2530        37637 1       54047 0       11616 0       02537 1       05464 1       02547 0       02543 1       32553 0

16,2540        00006 1       05014 1       01546 1       32554 1       00006 1       05014 1       01546 1       32555 0
16,2550        00006 1       05014 1       01546 1    C: 01100 1    C: 01200 1    C: 01300 0       37665 0       55563 1
16,2560        55550 1       03150 0       03174 0       03244 0       03160 0       03174 0       03150 0       37665 0
16,2570        03102 1       33332 0       03102 1       03260 0       33334 0       03102 1       33335 1       03102 1

16,2600        33332 0       03104 1       03260 0       33340 0       54400 1       54401 0       33333 1       03104 1
16,2610        33341 1       03102 1       37665 0       03102 1       37656 0       55672 1       33342 1       51672 0
16,2620        54400 1       04063 0    C: 26055 0       33336 1       03023 0       33337 0       03023 0       03046 0
16,2630        04063 0    C: 26716 0       12766 0       03244 0       11672 1       12615 0       43332 1       03102 1

16,2640        03260 0       43335 0       54400 1       54401 0       43333 0       03104 1       03260 0       03244 0
16,2650        03215 1       03215 1       43346 1       00006 1       03012 1       37655 0       04536 0    C: 02663 0
16,2660     C: 34005 0       33355 1       04416 0       33355 1       04422 1       04602 1       46162 0       61563 0
16,2670        00006 1       62673 1       12714 0       51563 0       32770 0       54400 1       54401 0       54402 0

16,2700        37652 1       00006 1       05012 1       00004 0       37656 0       04536 0    C: 02613 1    C: 22005 1
16,2710        00003 1       03174 0       25563 0       12652 0       03244 0       37665 0       55563 1       04063 0
16,2720     C: 20247 1       04063 0    C: 26712 1       12766 0       51563 0       32777 1       54424 1       54423 0
16,2730        06000 1    I: 77634 0    C: 20363 0       04063 0    C: 26712 1       12766 0       03167 1       25563 0

16,2740        47655 1       61563 0       00006 1       62724 1       37665 0       55563 1       54354 1       54352 1
16,2750        54353 0       47657 0       54351 1       51563 0       33004 0       54360 0       54361 1       03167 1
16,2760        25563 0       47653 1       67656 0       61563 0       00006 1       62753 1       04063 0    C: 30745 1
16,2770     C: 03013 0    C: 02660 0    C: 01042 0    C: 00000 1    C: 76736 1    C: 75120 0    C: 74765 0    C: 01463 1
```

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OCTAL LISTING OF PARAGRAPH # 112, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

16,3000      C: 01042 0    C: 00000 1    C: 76736 1    C: 76315 1    C: 00000 1    C: 00001 0    C: 00002 0    C: 00004 0
16,3010      C: 00010 0    C: 00020 0    C: 00040 0    C: 00100 0    C: 00200 0    C: 00237 1    C: 00400 0    C; 00545 0
16,3020      C: 00544 1    C; 77540 0    C: 77232 1       00006 1       23546 1       55577 1       10067 1       04404 0
16,3030         41577 1       51672 0       60032 0       00006 1       63026 0       51672 0       30032 0       57575 1

16,3040         57576 1       05470 1       53573 0       53571 1       00003 1       01546 1       00006 1       23546 1
16,3050         53576 0       00006 1       20001 1       55677 1       06000 1    I: 45345 1    C; 01573 1    C: 01571 0
16,3060      I: 67206 1    C: 01700 1    I: 56261 1    C: 00617 1    I: 45005 0    C: 35361 0    C: 33406 0    C: 00337 0
16,3070      I: 77776 1       33353 1       05332 0       05274 0       05140 1       12766 0       13100 1       13071 0

16,3100         25550 0       01546 1       54400 1       54401 0       54402 0       00006 1       23546 1       37663 0
16,3110         55551 0       04063 0    C: 26055 0       04063 0    C: 26716 0       12766 0       11551 0       03110 1
16,3120         03174 0       01546 1       00006 1       23546 1       04063 0    C: 26227 1       04063 0    C: 26716 0
16,3130         12766 0       01546 1       00006 1       23546 1       33344 1       54142 1       33347 1       05332 0

16,3140         05274 0       05140 1       12766 0       13145 0       13134 0       05300 1       25550 0       01546 1
16,3150         00006 1       23546 1       04063 0    C; 26000 0       04063 0    C; 26716 0       12766 0       01546 1
16,3160         43346 1       00006 1       03012 1       37653 0       00006 1       05012 1       00002 0       00006 1
16,3170         23545 1       25550 0       33352 0       13200 1       00006 1       23545 1       25550 0       33351 0

16,3200         05332 0       33354 0       05332 0       31550 0       73343 1       05332 0       05274 0       05140 1
16,3210         12766 0       13213 0       13177 1       05300 1       01545 1       00006 1       23545 1       04063 0
16,3220      C; 26000 0       37656 0       55512 1       37655 0       55544 1       00004 0       47646 0       70061 1
16,3230         67646 1       54061 1       00003 1       04063 0    C: 30760 0       05317 1       33351 0       05332 0

16,3240         03160 0       03132 1       03150 0       01545 1       37665 0       54400 1       54401 0       54402 0
16,3250         00006 1       23546 1       04063 0    C: 26055 0       04063 0    C: 26716 0       12766 0       01546 1
16,3260         00006 1       23545 1       03122 0       30032 0       55575 0       30033 1       55576 0       30034 0
16,3270         55577 1       03150 0       33345 0       04536 0    C: 03300 1    C; 34005 0       33356 1       04416 0

16,3300         33356 1       04422 1       04602 1       31575 1       00006 1       20032 1       54333 0       31576 1
16,3310         00006 1       20033 0       54334 1       31577 0       00006 1       20034 1       54335 0       33350 1
16,3320         05332 0       05274 0       05140 1       12766 0       13326 1       13317 0       25550 0       01545 1
16,3330      C: 00133 0    C; 06000 1    C: 10000 0    C; 14477 0    C: 20000 0    C: 30000 1    C; 01616 1    C: 34344 0

16,3340      C: 40000 0    C: 50000 1    C: 36162 1    C: 00077 1    C: 00030 1    C: 00454 1    C: 00050 1    C: 00110 1
16,3350      C: 00530 1    C: 00620 0    C: 00640 0    C: 00666 1    C: 03300 1    C: 34666 0    C: 35303 1    C: 02500 0
16,3360      C: 00043 0    C: 05000 1       03362 0       03363 1  CKSM 65074 1          @             @             @
16,3370            @             @             @             @             @             @             @             @
```

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OCTAL LISTING OF PARAGRAPH # 114, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

17,2000      37665 0      55576 0      55742 0      33626 0      55744 0      06000 1   I: 77634 0   C: 30530 1
17,2010   I: 77776 1      37657 1      55544 1      54340 1      54400 1      54401 0      54402 0      04063 0
17,2020   C: 26000 0      04063 0   C: 26716 0      12243 1      37665 0      54337 1      55537 0      55574 1
17,2030      55575 0      33660 1      54336 0      04063 0   C: 26055 0      03567 0      03576 0      04063 0

17,2040   C: 26716 0      02243 0      03344 1      03077 1      02106 1      03124 0      04063 0   C: 26716 0
17,2050      12243 1      11742 0      02072 0      06000 1   I: 71545 0   C: 01511 0   I: 72476 1   C: 07573 1
17,2060   C: 01511 0   I: 72556 1   C: 23571 0   C: 37630 0   C: 23721 1   C: 37636 0   C: 23727 1   C: 37644 0
17,2070   C: 01735 1   I: 77776 1      03612 1      04063 0   C: 42000 1      04614 0   C: 00000 1      37665 0

17,2100      54336 0      31640 1      54337 1      51544 0      55551 0      03576 0      51537 1      02110 0
17,2110      04063 0   C: 30422 0      33663 1      55632 0      37646 1      55527 1      37657 1      55673 0
17,2120      37665 0      51541 0      54037 1      55626 0      33675 0      03205 0      00004 0      02771 1
17,2130      00003 1      03065 1      37664 1      55673 0      51537 1      02136 1      04063 0   C: 30422 0

17,2140      11676 0      03227 0      11627 1      02147 1      05464 1      41632 0      55632 0      00006 1
17,2150      41627 1      21633 1      06000 1   I: 45345 1   C: 01635 0   C: 01631 1   I: 56325 0   C: 01633 0
17,2160   I: 41325 0   C: 37665 0   I: 77624 1   C: 33406 0   C: 00337 0   I: 77776 1      03576 0      33656 1
17,2170      55527 1      04063 0   C: 30422 0      30032 0      55530 1      51544 0      41550 1      55576 0

17,2200      03612 1      37665 0      55400 0      55401 1      55404 1      55405 0      55406 0      55407 1
17,2210      55412 0      55413 1      55414 0      55415 1      55420 1      55421 0      37637 1      55574 1
17,2220      55575 0      04063 0   C: 42000 1      04614 0   C: 00000 1      31636 0      54337 1      30032 0
17,2230      55531 0      37665 0      54336 0      03576 0      37657 1      61544 0      54340 1      37656 0

17,2240      55546 0      04063 0   C: 22343 0      04063 0   C: 30745 1      33666 1      00006 1      02030 0
17,2250      10000 0      02440 0      33661 0      05332 0      05401 1      04063 0   C: 26000 0      04063 0
17,2260   C: 26716 0      12243 1      37650 0      55776 1      33671 1      03236 0      03344 1      03077 1
17,2270      12245 1      03124 0      04063 0   C: 26716 0      12243 1      37656 0      55672 1      51672 0

17,2300      40400 1      51672 0      60032 0      55551 0      11551 0      02313 1      02310 1      02313 1
17,2310      11672 1      02276 0      02317 0      73674 0      10000 0      02440 0      02310 1      37657 1
17,2320      55673 0      47657 0      55670 0      37665 0      54037 1      54040 1      54041 0      37645 1
17,2330      55527 1      37657 1      03205 0      11676 0      03227 0      33675 0      03205 0      37656 0

17,2340      55541 1      00004 0      02771 1      00003 1      37665 0      51541 0      54037 1      03065 1
17,2350      57673 1      67655 0      55673 0      11541 1      02340 1      47655 1      61673 1      55673 0
17,2360      22007 0      51673 1      31626 1      22000 1      51673 1      21572 1      31673 1      71670 0
17,2370      10000 0      02355 0      37661 1      66165 0      55673 0      40000 0      55670 0      11676 0
```

OCTAL LISTING OF PARAGRAPH # 115, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
17,2400      03227 0      03250 0      33662 0      05332 0      05274 0      05140 1      02243 0      02410 0
17,2410      37665 0      54424 1      33676 0      54423 0      04063 0   C: 20247 1      04063 0   C; 26712 1
17,2420      02243 0      06000 1   I: 77634 0   C: 20363 0      04063 0   C: 26712 1      02440 0      05274 0
17,2430      05140 1      02243 0      02433 1      37665 0      54423 0      43676 1      54424 1      02414 1

17,2440      56002 0      55546 0      05413 1   C: 01411 1      01546 1      06000 1   I: 77634 0   C: 30530 1
17,2450   I: 77776 1      33651 0      05332 0      05140 1      12243 1      02451 0      56333 1      55614 1
17,2460      00006 1      62466 1      77671 1      00006 1      12470 1      02451 0      40000 0      02462 0
17,2470      31614 0      67655 0      50000 1      02474 1      02451 0      02503 0      02502 1      02501 1

17,2500      02474 1      02504 1      02510 1      02513 1      37655 0      55544 1      02515 1      02515 1
17,2510      37656 0      55544 1      02515 1      37657 1      55544 1      55617 1      55621 1      05401 1
17,2520      37665 0      55536 1      55622 1      55563 1      55615 0      33653 1      55623 0      04063 0
17,2530   C: 26000 0      04063 0   C; 26716 0      12243 1      03344 1      03077 1      12243 1      03124 0

17,2540      04063 0   C: 31703 1      55552 0      37652 1      02557 1      37652 1      00006 1      05014 1
17,2550      00004 0      47656 1      70370 1      67656 0      54370 1      37656 0      55552 0      55527 1
17,2560      37657 1      03205 0      11676 0      03227 0      04063 0   C: 34520 1      11552 0      02542 0
17,2570      11615 0      02652 1      11621 1      02612 0      02616 1      37665 0      54357 1      04063 0

17,2600   C: 30422 0      37657 1      54357 1      55622 1      27563 1      41563 1      77664 0      00006 1
17,2610      12760 0      02564 1      37665 0      55621 1      51672 0      54032 1      00004 0      37653 0
17,2620      55624 1      51672 0      10032 1      02635 0      02627 0      02440 0      02646 1      11624 1
17,2630      02620 1      00003 1      10067 1      04404 0      02616 1      43652 1      51672 0      54032 1

17,2640      37657 1      55615 0      30047 1      55620 0      00003 1      02652 1      33652 0      51672 0
17,2650      54032 1      02640 1      51672 0      10032 1      02660 0      02675 1      02660 0      02675 1
17,2660      37646 1      00006 1      02014 0      10000 0      02672 0      11622 1      02670 1      02575 1
17,2670      55622 1      02564 1      10067 1      04404 0      02652 1      00004 0      37665 0      54357 1

17,2700      56047 1      55621 1      47656 1      70370 1      54370 1      00003 1      31620 1      00006 1
17,2710      61621 0      55622 1      00006 1      62732 0      73654 1      00006 1      12724 0      41622 1
17,2720      73654 1      00006 1      12726 1      02760 1      31622 0      02732 0      37637 1      00006 1
17,2730      61622 0      02733 1      40000 0      22007 0      00006 1      11623 0      54336 0      02740 0

17,2740      05304 0      05312 1      31614 0      54340 1      33657 0      05332 0      05274 0      05140 1
17,2750      02752 0      02451 0      04063 0   C: 26000 0      04063 0   C: 26716 0      12243 1      12243 1
17,2760      04063 0   C: 26000 0      04063 0   C: 26716 0      12243 1      37665 0      54357 1      02440 0
17,2770      12243 1      00006 1      23546 1      00003 1      10067 1      04404 0      00004 0      37665 0
```

```
OCTAL LISTING OF PARAGRAPH # 116, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

17,3000         51541 0        56037 0        55551 0        11551 0        03010 0        03063 1        03023 0        03063 1
17,3010         37652 1        55540 0        51541 0        10037 1        03036 1        03020 0        03063 1        03020 0
17,3020         11540 0        03011 1        03063 1        37652 1        55540 0        51541 0        10037 1        03063 1
17,3030         03033 1        03036 1        03033 1        11540 0        03024 1        03063 1        05470 1        52141 1

17,3040         37654 1        55540 0        51541 0        10037 1        03050 1        03063 1        03050 1        03063 1
17,3050         11540 0        03041 1        03055 1        55551 0        01546 1        57551 1        51541 0        60037 0
17,3060         51541 0        54037 1        00002 0        03055 1        02773 0        31551 1        51673 1        55626 0
17,3070         30140 1        51673 1        55627 1        30141 0        51673 1        55630 1        00002 0        00006 1

17,3100         23546 1        06000 1     I: 77634 0     C: 32615 1     I: 77776 1        04063 0     C: 26055 0        33123 1
17,3110         71363 1        10000 0        03115 1        25546 1        03117 0        37656 0        55537 0        04063 0
17,3120      C: 26716 0        12243 1        01546 1     C: 00401 1        00006 1        23546 1        04063 0     C: 26000 0
17,3130         04063 0     C: 26716 0        12243 1        04063 0     C: 26227 1        04063 0     C: 26716 0        12243 1

17,3140         30032 0        50104 1        54024 0        30033 1        50104 1        54020 1        30034 0        50104 1
17,3150         54022 0        37653 0        60104 1        50104 1        54050 0        06000 1     I: 64375 1     C: 01401 0
17,3160      C: 01445 0     I: 77772 0     C: 36041 1     C: 32517 0     C: 23423 0     C: 01407 0     I: 76521 0     C: 01445 0
17,3170      C: 36041 1     C: 32517 0     C: 23431 0     C: 01423 0     I: 76435 1     C: 01431 0     C: 37437 0     C: 32367 1

17,3200      I: 77776 1        33673 0        04063 0     C: 26317 0        01546 1        00006 1        23545 1        55676 0
17,3210         11676 0        03215 1        01545 1        03215 1        03207 1        00004 0        31527 0        04536 0
17,3220      C: 03233 0     C: 36005 1        00003 1        11676 0        01545 1        01545 1        13227 1        55676 0
17,3230         33232 1        04416 0     C: 37210 0        33232 1        04422 1        04602 1        54001 1        13241 1

17,3240         55776 1        37665 0        50001 0        54000 0        24001 0        11776 1        13240 0        00002 0
17,3250         06000 1     I: 77170 1     C: 00026 0     C: 00012 1     I: 77731 1     C: 00051 0     C: 00004 0     I: 77731 1
17,3260      C: 00052 0     C: 00004 0     I: 44743 1     C: 76120 0     C: 01657 1     I: 41323 0     C: 76156 1     C: 37665 0
17,3270      I: 77671 1     I: 55504 0     C: 37277 1     I: 45046 1     C: 33406 0     C: 36337 0     C: 37301 1     I: 60006 1

17,3300      C: 37262 0     I: 77776 1        05317 1        03576 0        06000 1     I: 41535 1     C: 01630 0     I: 41535 1
17,3310      C: 01634 1     I: 55535 1     C: 01640 1     I: 76456 1     I: 77606 1     I: 41535 1     C: 01644 0     I: 41535 1
17,3320      C: 01650 0     I: 55535 1     C: 01654 1     I: 76456 1     I: 45325 1     C: 01655 0     C: 01641 0     I: 77612 1
17,3330      I: 77652 0     C: 23530 0     I: 51435 1     I: 56205 0     C: 37670 1     C: 01530 0     I: 77624 1     C: 33406 0

17,3340      C: 00337 0     I: 77776 1        03576 0        12402 1        00006 1        23546 1        06000 1     I: 54160 1
17,3350      C: 37704 0     C: 01536 0     I: 77773 1     C: 00001 0     C: 01445 0     I: 54160 1     C: 37716 0     C: 01536 0
17,3360      I: 77773 1     C: 00001 0     C: 07453 1     C: 33042 1     C: 06007 0     C: 01507 1     I: 57546 1     C: 06011 1
17,3370      C: 01507 1     I: 77756 0     C: 00013 0     I: 77775 1     C: 37717 1     C: 36015 0     C: 32677 0     I: 77776 1
```

```
OCTAL LISTING OF PARAGRAPH # 117, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

17,3400        33663 1       55776 1       33703 0       03236 0       51544 0       03406 0       03524 1       03422 0
17,3410        03431 1       03436 0       03450 0       03460 0       03470 1       03500 1       03513 0       03542 1
17,3420        03553 1       03564 0       37642 0       55400 0       55410 1       55420 1       37665 0       55541 1
17,3430        01546 1       47642 1       55400 0       55412 0       55416 1       03426 1       37642 0       55414 0

17,3440        40000 0       55402 1       55412 0       37656 0       55541 1       37665 0       55576 0       01546 1
17,3450        47642 1       55414 0       40000 0       55410 1       55404 1       37656 0       55541 1       01546 1
17,3460        37642 0       55406 0       40000 0       55404 1       55416 1       37657 1       55541 1       03445 1
17,3470        37642 0       55402 1       55420 1       40000 0       55406 0       37657 1       55541 1       01546 1

17,3500        47642 1       55402 1       33677 1       55406 0       55414 0       55420 1       40000 0       55412 0
17,3510        37665 0       55363 1       03445 1       37642 0       55404 1       33677 1       55406 0       55416 1
17,3520        55414 0       40000 0       55410 1       03445 1       33700 0       55400 0       55410 1       55412 0
17,3530        55414 0       33677 1       55406 0       33702 1       55402 1       55420 1       43701 0       55404 1

17,3540        55416 1       01546 1       37642 0       55416 1       33677 1       55400 0       55404 1       55406 0
17,3550        40000 0       55412 0       03445 1       37642 0       55420 1       33677 1       55400 0       55406 0
17,3560        55410 1       40000 0       55402 1       03445 1       04063 0    C: 43107 0       01546 1       30336 1
17,3570        55527 1       30337 0       55536 1       30340 0       55544 1       00002 0       00006 1       23546 1

17,3600        31544 0       54340 1       33657 0       05332 0       05274 0       05140 1       02234 0       01546 1
17,3610        03567 0       13600 0       00006 1       23546 1       06000 1    I: 77775 1    C: 01401 0    C; 23750 1
17,3620     C: 01407 0    C: 23756 1    C: 01415 0    C: 01764 0    I: 77776 1       01546 1    C: 00144 0    C: 17127 0
17,3630     C: 16705 1    C: 07314 0    C: 36223 1    C: 04521 0    C: 31140 0    C: 75755 1    C; 73521 0    C: 72476 1

17,3640     C: 54176 0    C: 04771 1    C: 03365 1    C: 75644 0    C: 70661 1    C: 47762 1    C: 75077 0    C: 70023 1
17,3650     C: 73740 0    C: 02130 1    C: 04000 0    C: 04143 0    C: 34000 0    C: 00264 1    C: 07626 1    C: 00666 1
17,3660     C: 01130 1    C: 01620 1    C: 01640 1    C: 00021 1    C: 06200 0    C: 00000 1    C: 00400 0    C: 00024 1
17,3670     C: 35474 0    C: 01506 0    C: 02521 0    C: 02500 0    C: 77760 0    C: 00070 0    C: 10000 0    C: 13241 1

17,3700     C: 10000 0    C: 15520 1    C: 02260 1    C: 01400 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1
17,3710     C; 20000 0    C: 00000 1    C: 00000 1    C; 00000 1    C; 00000 1    C: 00000 1    C; 20000 0    C; 00000 1
17,3720     C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 00000 1    C: 57777 1    C: 77777 0
17,3730        03730 0       03731 1  CKSM 63000 1         @             @             @             @             @

17,3740          @             @             @             @             @             @             @             @
17,3750          @             @             @             @             @             @             @             @
17,3760          @             @             @             @             @             @             @             @
17,3770          @             @             @             @             @             @             @             @
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```
OCTAL LISTING OF PARAGRAPH # 120, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

20,2000     C: 00051 0   C: 00062 0   C: 01374 0   C: 01400 1   C: 01462 0   C: 01774 1   C: 17777 0   C: 25252 0
20,2010     C: 37737 0   C: 37776 0   C: 52400 1   C: 76777 1   C: 77770 1   C: 01371 0   C: 00021 1   C: 02101 0
20,2020        30002 0      55364 0      25365 0      05413 1   C: 01102 0      11361 0      37665 0      55361 0
20,2030        02101 0      01364 1      40000 0      10000 0      12020 0      12020 0      12020 0      00002 0

20,2040        40000 0      10000 0      12020 0      12020 0      10000 0      12020 0      00002 0      00006 1
20,2050        23371 0      04457 0      11361 0      02060 0      02051 1      02060 0      25366 0      01371 0
20,2060        62014 0      00006 1      62065 0      04102 0   C: 03000 1      25366 0      67663 0      50000 1
20,2070        02071 0      02102 0      02767 0      03043 0      03137 1      03307 0      03516 0      03605 1

20,2100        01371 0      02047 0      02104 0      02111 1      12106 0      02020 1      46165 1      00002 0
20,2110        02020 1      10000 0      02020 1      02020 1      02116 0      02020 1      10000 0      02123 0
20,2120        02020 1      02020 1      02020 1      55371 1      11371 1      02131 0      02020 1      02020 1
20,2130        02020 1      10000 0      02020 1      02136 1      02020 1      02020 1      40000 0      10000 0

20,2140        02020 1      02020 1      02020 1      10000 0      02020 1      02150 1      02020 1      02020 1
20,2150        41371 1      02041 0      37647 0      00006 1      62175 0      40000 0      00006 1      62161 0
20,2160        02020 1      33431 1      67657 1      00006 1      62176 0      37665 0      00006 1      62171 1
20,2170        02020 1      40000 0      00006 1      62177 1      02020 1      02020 1      02020 1      32016 1

20,2200        55377 1      35235 0      51377 0      54000 0      10021 0      51377 0      40000 0      60021 1
20,2210        00006 1      20021 0      00006 1      60021 1      30021 1      70021 0      02040 1      00006 1
20,2220        70021 0      00006 1      10021 0      30021 1      02040 1      32015 1      55376 0      37667 1
20,2230        55371 1      40000 0      57371 0      57372 0      00006 1      51376 1      30001 0      00006 1

20,2240        52015 1      40001 1      02041 0      30001 0      02040 1      00006 1      51376 1      30001 0
20,2250        02040 1      30001 0      02041 0      37641 0      55371 1      37656 0      55372 1      37657 1
20,2260        01371 0      02041 0      01371 0      02033 0      37664 1      00006 1      12311 1      40000 0
20,2270        00006 1      12312 1      33431 1      67657 1      00006 1      12313 0      40000 0      00006 1

20,2300        12314 1      37665 0      00006 1      12305 1      02020 1      40000 0      00006 1      12315 0
20,2310        02020 1      02020 1      02020 1      02020 1      02020 1      33431 1      67656 0      55371 1
20,2320        02020 1      40000 0      55372 1      43431 0      54001 1      40000 0      53372 1      02040 1
20,2330        30001 0      02041 0      00006 1      27371 1      00006 1      27372 1      33431 1      61372 0

20,2340        02040 1      43431 0      61371 0      02041 0      37657 1      00006 1      26000 0      00006 1
20,2350        26000 0      02033 0      00006 1      26000 0      02032 1      37667 1      54001 1      37656 0
20,2360        20001 1      67671 0      02040 1      37657 1      60001 0      02041 0      00006 1      33432 1
20,2370        53374 1      37670 1      54001 1      36165 0      21374 1      22000 1      02032 1      30001 0
```

OCTAL LISTING OF PARAGRAPH # 121, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
20,2400      02040 1     00006 1     31374 0     22000 1     02041 0     30001 0     02040 1     25374 0
20,2410      61374 0     02033 0     24000 1     02040 1     00006 1     43432 0     53372 1     36165 0
20,2420      54001 1     40000 0     21372 1     02041 0     00006 1     41372 1     56001 0     67657 1
20,2430      02041 0     30001 0     02040 1     37657 1     00006 1     24000 1     55375 0     40000 0

20,2440      54002 1     40000 0     00006 1     73431 0     60001 0     00006 1     70002 1     26001 1
20,2450      62011 0     02041 0     30001 0     00006 1     71375 0     55376 0     00006 1     25376 1
20,2460      60001 0     00006 1     71376 0     02040 1     40001 1     62011 0     02033 0     37657 1
20,2470      27376 0     02041 0     31376 1     02041 0     37642 0     55371 1     60000 1     67657 1

20,2500      54001 1     02020 1     40000 0     55372 1     37666 0     23371 0     00006 1     11371 1
20,2510      40000 0     22000 1     02032 1     00006 1     11372 1     55374 1     40000 0     55373 0
20,2520      67642 0     02033 0     30001 0     02033 0     33431 1     54001 1     32006 0     00006 1
20,2530      11373 0     56001 0     40000 0     00006 1     11374 1     62011 0     02041 0     33431 1

20,2540      56001 0     67642 0     02040 1     42006 1     00006 1     11374 1     60001 0     62011 0
20,2550      02040 1     56001 0     02041 0     42011 1     54002 1     40000 0     00006 1     10002 1
20,2560      00006 1     22001 0     60002 0     02041 0     30001 0     63431 1     02040 1     00006 1
20,2570      23371 0     30002 0     02040 1     41371 1     67656 0     02041 0     37665 0     55371 1

20,2600      40000 0     55372 1     00006 1     20000 0     02032 1     00006 1     21372 1     02040 1
20,2610      00006 1     33432 1     00006 1     20001 1     54000 0     02617 0     02020 1     02041 0
20,2620      37663 0     54001 1     72014 1     02032 1     37657 1     70001 1     02040 1     37657 1
20,2630      54001 1     55371 1     50000 1     60000 1     00006 1     61371 0     02040 1     00006 1

20,2640      50001 0     60000 1     02041 0     37656 0     54001 1     37657 1     00006 1     40001 1
20,2650      02041 0     52002 1     55373 0     60002 0     02040 1     30001 0     02032 1     37667 1
20,2660      54002 1     40000 0     00006 1     30002 0     60002 0     61373 1     02040 1     30001 0
20,2670      02041 0     37670 1     54002 1     33432 1     26002 1     40002 1     54000 0     02020 1

20,2700      00006 1     30002 0     54000 0     02705 1     02020 1     02041 0     37642 0     54002 1
20,2710      26002 1     26002 1     54000 0     02020 1     26002 1     02040 1     00004 0     37665 0
20,2720      54015 1     00003 1     60027 1     55371 1     41371 1     60027 1     00006 1     12724 0
20,2730      00004 0     30015 0     00006 1     12735 0     02716 0     37657 1     04536 0  C: 02762 0

20,2740   C: 40003 0     33431 1     62010 1     00003 1     40000 0     10000 0     02752 0  C: 02756 1
20,2750      67656 0     02744 1     00004 0     55375 0     02020 1     00003 1     40015 1     00006 1
20,2760      12020 0     02766 1     40015 1     62747 1     02041 0     04602 1     02047 0     37667 1
20,2770      00006 1     01002 1     22002 0     02041 0     00006 1     00001 0     02041 0     30001 0
```

OCTAL LISTING OF PARAGRAPH # 122, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
20,3000        02041 0     46165 1     54001 1     32011 0     00006 1     04001 1     02041 0     32011 0
20,3010        00006 1     05001 0     02041 0     30001 0     02041 0     42011 1     54001 1     32006 0
20,3020        00006 1     02001 1     02040 1     32006 0     00006 1     03001 0     02040 1     47664 0
20,3030        56001 0     02040 1     36162 1     00006 1     06001 0     67656 0     02041 0     30001 0

20,3040        67655 0     02041 0     02047 0     00006 1     33432 1     53377 1     31376 1     56002 0
20,3050        00006 1     40002 1     10000 0     03062 0     03067 0     55376 0     61377 0     02041 0
20,3060        25377 0     03046 0     60001 0     02041 0     04457 0     41376 0     03047 1     31377 0
20,3070        61376 1     02033 0     33432 1     55375 0     40000 0     00004 0     63431 1     67657 1

20,3100        56002 0     10002 1     03117 0     02020 1     55373 0     02020 1     31373 1     61375 1
20,3110        02041 0     00003 1     04457 0     31374 0     00006 1     27375 0     03075 0     55374 1
20,3120        03130 0     31374 0     61375 1     02041 0     31375 1     63432 1     67667 1     03100 0
20,3130        31375 1     02033 0     41374 1     62011 0     02041 0     00003 1     02047 0     37657 1

20,3140        55374 1     37665 0     54003 0     32004 1     55377 1     36426 1     55373 0     03167 1
20,3150        32003 0     55377 1     36426 1     55373 0     03167 1     32003 0     55377 1     32005 0
20,3160        55373 0     03167 1     55374 1     32001 1     55377 1     32002 1     55373 0     00004 0
20,3170        31377 0     54001 1     24001 0     50000 1     52001 1     53376 0     51377 0     40001 1

20,3200        51377 0     60000 1     02041 0     00006 1     51377 0     40001 1     51377 0     52001 1
20,3210        51377 0     40000 0     51377 0     60001 0     02041 0     53376 0     51377 0     52001 1
20,3220        00003 1     30003 1     55372 1     04457 0     31372 0     54003 0     25377 0     41377 1
20,3230        61373 1     00006 1     13234 0     03167 1     11374 1     03162 1     25374 0     30003 1

20,3240        67647 0     54003 0     62013 1     00006 1     13155 1     10003 0     03150 0     32003 0
20,3250        54003 0     32000 0     55372 1     67654 1     50000 1     40000 0     11372 1     03252 1
20,3260        32007 1     54020 1     54022 0     54021 0     54023 1     60020 0     60022 1     60021 1
20,3270        60023 0     62012 0     02041 0     60020 0     60022 1     60021 1     60023 0     67657 1

20,3300        02041 0     25367 1     02047 0     03307 0     05304 0     05312 1     03311 1     37666 0
20,3310        55376 0     37665 0     55374 1     37657 1     55377 1     37665 0     55371 1     55373 0
20,3320        37657 1     55375 0     31373 1     61374 0     04116 0     03351 0     67645 1     03362 0
20,3330        40000 0     55377 1     00006 1     13336 0     37644 0     03337 0     34506 0     55373 0

20,3340        37665 0     55371 1     37657 1     55375 0     00006 1     51373 1     30001 0     03351 0
20,3350        03362 0     55372 1     61371 0     55371 1     37665 0     61371 0     55371 1     41372 1
20,3360        61373 1     00002 0     10000 0     03373 0     03373 0     03373 0     11375 0     03374 1
20,3370        30001 0     03351 0     03434 1     37657 1     55375 0     11376 0     10067 1     04404 0
```

OCTAL LISTING OF PARAGRAPH # 123, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
20,3400        03402 1      04457 0      25373 1      11377 1      03322 1      03322 1      03344 1      03344 1
20,3410        31374 0      67645 1      55374 1      03416 1      37641 0      55374 1      63437 1      00006 1
20,3420        13427 1      11377 1      03314 1      37657 1      03330 1      37651 1      03314 1      11376 0
20,3430        03311 1   C; 37777 1   C: 40000 0      03515 0      11376 0      03471 0   C; 00501 0   C; 33777 0

20,3440        11371 1      03445 1   C: 41471 0      03445 1      37667 1      55371 1      31374 0      05207 1
20,3450        40000 0      61371 0      02041 0      03410 1      37657 1      55376 0      37665 0      55361 0
20,3460        32017 0      55360 1      00004 0      37645 1      04363 0   C; 03304 0   C: 40002 1      00003 1
20,3470        04440 0      31374 0      05207 1      57372 0      55373 0      32015 1      54142 1      33436 0

20,3500        05107 1      03513 0      05274 0      05140 1      03507 0      03410 1      03475 1      05401 1
20,3510        32017 0      55371 1      04440 0      33442 0      05327 1      02047 0      33431 1      55372 1
20,3520        33431 1      00006 1      71372 1      60001 0      63432 1      02033 0      04457 0      11372 1
20,3530        55372 1      11372 1      03520 0      33431 1      55372 1      37667 1      00006 1      71372 1

20,3540        02033 0      30001 0      61372 0      02033 0      04457 0      11372 1      55372 1      11372 1
20,3550        03535 1      33431 1      55371 1      31371 0      00006 1      73431 0      60001 0      63432 1
20,3560        02033 0      04457 0      11371 1      55371 1      11371 1      03553 1      33431 1      55371 1
20,3570        31371 0      00006 1      77667 0      02033 0      30001 0      61371 0      02033 0      04457 0

20,3600        11371 1      55371 1      11371 1      03570 0      02047 0      47644 1      55374 1      25374 0
20,3610        37642 0      55371 1      40000 0      55372 1      43431 0      54001 1      32006 0      00006 1
20,3620        11371 1      55377 1      33432 1      56001 0      02040 1      32006 0      00006 1      11372 1
20,3630        61377 0      02033 0      33431 1      56001 0      02040 1      42006 1      00006 1      11371 1

20,3640        55376 0      61377 0      02033 0      33431 1      56001 0      02041 0      42006 1      00006 1
20,3650        11372 1      61376 1      02033 0      33431 1      56001 0      02041 0      31376 1      67670 1
20,3660        63431 1      02040 1      32006 0      00006 1      11371 1      63432 1      02033 0      47642 1
20,3670        60001 0      02041 0      37665 0      54001 1      32011 0      55371 1      00006 1      11371 1

20,3700        40000 0      62011 0      02041 0      30001 0      63432 1      02041 0      37665 0      55371 1
20,3710        54001 1      40000 0      55372 1      00006 1      11371 1      55377 1      30001 0      02032 1
20,3720        40000 0      00006 1      11372 1      55376 0      61377 0      02033 0      40000 0      56001 0
20,3730        02032 1      00006 1      11371 1      61377 0      02033 0      30001 0      02033 0      00006 1

20,3740        11372 1      61376 1      02033 0      30001 0      02033 0      31376 1      62011 0      02041 0
20,3750        04457 0      31374 0      00006 1      63607 0      25370 1      02101 0      03756 0      03757 1
20,3760   CKSM 76511 0         @            @            @            @            @            @            @
20,3770           @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 124, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

21,2000      04614 0   C: 00101 1      00004 0      30025 0      55745 1      37665 0      54037 1      54040 1
21,2010      54041 0      54404 0      54406 1      54410 0      00003 1      02753 1      33360 1      55776 1
21,2020      33361 0      04063 0   C: 37236 1      06000 1   I: 77775 1   C: 03353 1   C: 01601 1   I: 77776 1
21,2030      11742 0      02033 0      02667 1      31527 0      55746 1      04667 1   C: 00005 1      04063 0

21,2040   C: 16345 1      02740 0      00004 0      30025 0      55745 1      31664 1      55716 1      04614 0
21,2050   C: 00201 1      02053 0      00004 0      31716 0      55664 0      10000 0      30000 1      55665 1
21,2060      40000 0      55664 0      30037 0      54403 1      30040 0      54405 1      30041 1      54407 0
21,2070      37665 0      54037 1      54040 1      54041 0      04614 0   C: 00701 1      00003 1      37642 0

21,2100      04374 0   C: 02104 0   C: 42005 1      04602 1      03047 1      04614 0   C: 00601 0      11742 0
21,2110      02112 1      02116 0      04063 0   C: 16000 0      02116 0      03070 0      06000 1   I: 77745 1
21,2120   C: 03351 0   C: 00051 0   I: 53135 0   C: 01743 0   C: 42127 0   I: 77650 1   C: 42144 0   I: 50135 0
21,2130   C: 01666 0   C: 42144 0   I: 72174 0   C: 00014 1   C: 01600 0   I: 62143 0   C: 03343 0   C: 77775 1

21,2140   C: 05701 1   I: 66104 1   C: 42135 0   C: 01600 0   I: 61375 1   C: 00404 1   C: 01750 1   I: 77772 0
21,2150   I: 57545 1   C: 00144 0   C: 07657 1   C: 00146 1   C: 01663 0   I: 76001 1   C: 00001 0   C: 00010 0
21,2160   I: 53135 0   C: 01743 0   C: 42165 0   I: 77650 1   C: 42466 0   I: 41343 0   C: 01667 1   C: 03364 0
21,2170   I: 42661 0   C: 01212 1   C: 01715 0   I: 64623 1   C: 01635 0   C: 01655 0   I: 41223 1   C: 01627 0

21,2200   C: 03366 1   I: 77732 1   I: 45415 0   C: 74062 0   C: 17717 0   C: 01655 0   C: 11627 1   C: 03347 1
21,2210   C: 03635 1   I: 77100 0   C: 42165 0   C: 00004 0   I: 56743 1   C: 76170 0   C: 76104 0   C: 05607 0
21,2220   I: 77104 1   C: 42214 0   C: 00010 0   I: 66140 1   C: 01601 1   C: 01601 1   I: 56743 1   C: 01604 1
21,2230   C: 76062 1   I: 77613 0   C: 76142 1   C: 21635 1   C: 76160 1   I: 77613 0   C: 76074 0   C: 05617 1

21,2240   I: 42673 0   C: 76062 1   C: 76132 0   C: 21645 0   C: 03371 1   I: 76403 1   C: 76062 1   I: 77613 0
21,2250   C: 76122 1   C: 05655 1   I: 76104 0   C: 42223 1   C: 00010 0   I: 64743 0   C: 01657 1   C: 01655 0
21,2260   I: 55523 0   C: 01665 0   I: 76521 0   C: 01721 1   I: 77745 1   C: 00141 0   C: 11665 1   C: 00144 0
21,2270   C: 11655 1   C: 00146 1   C: 03657 0   I: 77700 0   C: 42255 0   I: 76174 1   C: 00006 1   C: 00002 0

21,2300   I: 57343 1   C: 01637 1   C: 03374 1   I: 77722 0   I: 73406 1   I: 56172 0   C: 00046 0   C: 12021 1
21,2310   I: 77746 1   C: 04027 0   I: 71304 0   C: 42300 1   C: 00017 1   I: 43312 0   C: 01625 1   C: 07625 1
21,2320   C: 00015 0   I: 56405 0   C: 00025 0   I: 77615 0   C: 01631 1   C: 07631 1   C: 00021 1   I: 57275 0
21,2330   C: 00023 0   C: 00017 1   I: 77712 0   I: 57325 1   C: 00013 0   C: 00015 0   I: 77615 0   I: 77675 0

21,2340   C: 01573 1   I: 57325 1   C: 00023 0   C: 00025 0   I: 66405 0   C: 01571 0   I: 77621 1   C: 01637 1
21,2350   I: 45425 0   C: 70156 1   C: 00021 1   I: 41275 1   C: 00025 0   C: 01573 1   I: 77732 1   I: 57325 1
21,2360   C: 01571 0   C: 00017 1   I: 77615 0   C: 01641 0   I: 77625 0   I: 57325 1   C: 01575 1   C: 01573 1
21,2370   I: 45415 0   C: 70062 1   C: 00023 0   I: 76405 1   C: 00013 0   I: 57325 1   C: 00015 0   C: 00021 1
```

```
OCTAL LISTING OF PARAGRAPH # 125, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

21,2400      I: 76405 1   C: 00017 1   I: 77621 1   I: 77675 0   C: 01573 1   I: 57325 1   C: 00015 0   C: 00025 0
21,2410      I: 76405 1   C: 01571 0   I: 77621 1   C: 01577 0   I: 77615 0   I: 77606 1   I: 74475 1   C: 00015 0
21,2420      I: 57325 1   C: 01621 0   C: 00023 0   I: 77615 0   I: 77671 1   C: 00025 0   I: 57206 1   C: 03376 0
21,2430      I: 43261 0   C: 01616 1   C: 01635 0   C: 07635 0   I: 43275 0   C: 00017 1   C: 01715 0   I: 54275 0

21,2440      C: 03376 0   C: 01616 1   I: 77615 0   C: 01633 0   C: 07633 0   C: 00023 0   I: 76405 1   I: 57325 1
21,2450      C: 00015 0   C: 01621 0   I: 77621 1   I: 54275 0   C: 03376 0   C: 01616 1   I: 77615 0   C: 01627 0
21,2460      C: 01627 0   I: 77404 1   C: 42716 1      11527 1      02666 0      02631 1   I: 44743 1   C: 01667 1
21,2470      C: 01655 0   I: 42675 0   C: 03400 0   C: 01655 0   C: 03655 1   I: 77613 0   C: 01657 1   C: 03657 0

21,2500      I: 42675 0   C: 03402 1   C: 01655 0   I: 41475 1   C: 03400 0   I: 67300 0   C: 42466 0   C: 01747 1
21,2510      I: 71254 1   C: 42522 1   C: 01627 0   I: 45425 0   C: 70150 1   I: 77621 1   C: 01631 1   C: 01631 1
21,2520      I: 77650 1   C: 42544 1   I: 43345 1   C: 01625 1   C: 01645 1   C: 07625 1   C: 01645 1   I: 44275 1
21,2530      C: 03404 1   C: 01631 1   C: 07631 1   C: 01651 1   I: 44275 1   C: 03404 1   C: 01627 0   I: 41325 0

21,2540      C: 01653 0   C: 03406 0   I: 45421 1   C: 76150 1   I: 64375 1   C: 01625 1   C: 01750 1   I: 53372 1
21,2550      C: 01617 0   C: 01617 0   I: 77776 1      11527 1      02666 0      10357 1      12742 0      04614 0
21,2560      C: 00401 1      06000 1   I: 53375 0   C: 01617 0   C: 01772 1   C: 01772 1   I: 77776 1      04063 0
21,2570      C: 30422 0      00004 0      31717 1      00006 1      62727 1      03107 1      04614 0   C: 01001 1

21,2600         37665 0      55717 0      00003 1      06000 1   I: 77770 1   C: 00022 1   I: 77731 1   C: 00051 0
21,2610      C: 00006 1   I: 50373 0   C: 01423 0   C: 01764 0   I: 50313 0   C: 01423 0   C: 01756 1   I: 50313 0
21,2620      C: 01423 0   C: 01750 1   I: 53466 0   C: 03445 1   I: 47100 0   C: 42611 1   C: 32367 1   I: 77776 1
21,2630         02645 1      06000 1   I: 65345 0   C: 01627 0   C: 01633 0   I: 55525 0   C: 01635 0   I: 74276 1

21,2640      C: 03374 1   I: 74521 1   C: 01750 1   C: 01501 1   I: 77776 1      04614 0   C: 00501 0      33362 0
21,2650         04063 0   C: 26317 0      04063 0   C: 26716 0      02721 1      11574 1      02664 1      02753 1
21,2660         11742 0      02725 0      04063 0   C: 36075 0      04063 0   C: 36223 1      55527 1      04614 0
21,2670      C: 00301 0      11574 1      02674 0      02676 1      04063 0   C: 30422 0      00004 0      40025 1

21,2700         61745 0      00006 1      62704 0      67641 0      61744 1      00006 1      62714 1      04536 0
21,2710      C: 02042 0   C: 42005 1      00003 1      04440 0      37656 0      02707 0      05413 1   C: 01600 0
21,2720         02723 0      05413 1   C: 01601 1      04063 0   C: 30745 1      04063 0   C: 37612 0      00003 1
21,2730         06000 1   I: 77775 1   C: 03343 0   C: 01617 0   C: 01625 1   I: 77776 1      11746 1      55746 1

21,2740         37662 1      55527 1      11746 1      02667 1      04702 0   C: 00003 1      02750 1      02667 1
21,2750         04667 1   C: 00002 0      02667 1      00006 1      23547 0      06000 1   I: 77634 0   C: 30405 0
21,2760      I: 77776 1      04063 0   C: 30727 0      01547 0      51074 0      02765 1      02776 0      03003 1
21,2770         03010 0      03015 0      03022 1      03027 1      03034 0      03040 0      37642 0      04374 0
```

OCTAL LISTING OF PARAGRAPH # 126, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
21,3000     C: 02002 1   C: 42005 1      04076 1      37657 1      04536 0   C: 02052 1   C: 42005 1      04076 1
21,3010        37642 0      04374 0   C: 02676 1   C: 42005 1      04076 1      37642 0      04374 0   C: 02571 0
21,3020     C: 42005 1      04076 1      37642 0      04374 0   C: 02655 0   C: 42005 1      04076 1      37642 0
21,3030        04374 0   C: 02115 0   C: 42005 1      04076 1      37657 1      04536 0   C: 02077 0   C: 42005 1

21,3040        37642 0      04374 0   C: 02600 0   C: 42005 1      04076 1   C: 02000 0   C: 02400 1      33045 0
21,3050        54001 1      33360 1      54140 0      50140 1      31600 0      22003 1      50140 1      55407 1
21,3060        22003 1      10140 0      13064 1      00002 0      54140 0      33045 0      54001 1      13053 0
21,3070        33360 1      54140 0      33045 0      56003 1      54001 1      50140 1      31407 0      22003 1

21,3100        50140 1      55600 1      10140 0      13105 1      00002 0      54140 0      13072 0      00006 1
21,3110        23547 0      33410 1      54140 0      50000 1      31720 0      50140 1      55400 0      10140 0
21,3120        13112 1      01547 0   C: 77743 1   C: 77776 1   C: 35143 1   C: 10237 0   C: 31766 1   C: 26106 1
21,3130     C: 77772 0   C: 43677 0   C: 77777 0   C: 77661 0   C: 00002 0   C: 05420 1   C: 77705 0   C: 77776 1

21,3140     C: 37560 0   C: 05346 0   C: 37522 0   C: 15525 1   C: 77763 0   C: 41604 0   C: 77777 0   C: 76470 0
21,3150     C: 00007 0   C: 02201 0   C: 77767 1   C: 77776 1   C: 37773 0   C: 10042 0   C: 37747 1   C: 30232 1
21,3160     C: 00006 1   C: 37666 0   C: 77777 0   C: 76703 1   C: 00001 0   C: 36147 0   C: 77635 1   C: 77776 1
21,3170     C: 37666 0   C: 11022 1   C: 37532 1   C: 33647 1   C: 00007 0   C: 03641 1   C: 77777 0   C: 75713 0

21,3200     C: 77774 0   C: 54605 0   C: 77407 1   C: 77776 1   C: 37712 1   C: 16755 1   C: 37630 0   C: 01160 1
21,3210     C: 00000 1   C: 23600 0   C: 77777 0   C: 63663 1   C: 77777 0   C: 56527 1   C: 77255 0   C: 77776 1
21,3220     C: 37763 1   C: 23341 0   C: 37755 1   C: 26170 0   C: 00000 1   C: 00254 1   C: 77777 0   C: 52755 1
21,3230     C: 77777 0   C: 76764 0   C: 77147 0   C: 77776 1   C: 37772 1   C: 02343 1   C: 37761 0   C: 30560 1

21,3240     C: 00000 1   C: 00362 0   C: 00000 1   C: 17261 1   C: 77777 0   C: 77671 1   C: 77015 0   C: 77776 1
21,3250     C: 37765 1   C: 12403 0   C: 37752 0   C: 20062 1   C: 00000 1   C: 00224 0   C: 00000 1   C: 06150 0
21,3260     C: 77777 0   C: 77762 1   C: 77161 1   C: 77776 1   C: 37767 0   C: 12513 0   C: 37756 1   C: 30343 0
21,3270     C: 00000 1   C: 00060 1   C: 00000 1   C: 01445 0   C: 77777 0   C: 77774 0   C: 76651 1   C: 77776 1

21,3300     C: 37771 1   C: 02603 0   C: 37762 0   C: 10061 1   C: 00000 1   C: 00023 0   C: 00000 1   C: 00402 1
21,3310     C: 00000 1   C: 00000 1   C: 76505 0   C: 77776 1   C: 37772 1   C: 22005 1   C: 37765 1   C: 05560 1
21,3320     C: 00000 1   C: 00005 1   C: 00000 1   C: 00113 1   C: 00000 1   C: 00000 1   C: 76651 1   C: 77776 1
21,3330     C: 37773 0   C: 20750 1   C: 37767 0   C: 03044 1   C: 00000 1   C: 00003 1   C: 00000 1   C: 00033 1

21,3340     C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1   C: 00000 1
21,3350     C: 00004 0   C: 00002 0   C: 00220 1   C: 77776 1   C: 35730 0   C: 00035 1   C: 10317 0   C: 17550 1
21,3360     C: 00115 1   C: 01577 0   C: 02500 0   C: 04133 1   C: 02265 1   C: 57223 0   C: 66451 1   C: 05427 0
21,3370     C: 12577 1   C: 77567 0   C: 44202 1   C: 24276 1   C: 14066 1   C: 23073 1   C: 11773 1   C: 03146 1
```

OCTAL LISTING OF PARAGRAPH # 127, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
21,3400    C: 14632 0  C: 00121 0  C: 35341 1  C: 00631 0  C: 23146 0  C: 00000 1  C: 17565 1  C: 06200 0
21,3410    C: 00021 1  C: 00023 0  C: 00062 0     37657 1     55742 0     04667 1  C: 00001 0     33407 1
21,3420       55110 1     37665 0     55717 0     33412 0     55744 0     04063 0  C: 36005 1     03427 0
21,3430       03430 0 CKSM 63236 0      @           @           @           @           @           @

21,3440         @           @           @           @           @           @           @           @
21,3450         @           @           @           @           @           @           @           @
21,3460         @           @           @           @           @           @           @           @
21,3470         @           @           @           @           @           @           @           @

21,3500         @           @           @           @           @           @           @           @
21,3510         @           @           @           @           @           @           @           @
21,3520         @           @           @           @           @           @           @           @
21,3530         @           @           @           @           @           @           @           @

21,3540         @           @           @           @           @           @           @           @
21,3550         @           @           @           @           @           @           @           @
21,3560         @           @           @           @           @           @           @           @
21,3570         @           @           @           @           @           @           @           @

21,3600         @           @           @           @           @           @           @           @
21,3610         @           @           @           @           @           @           @           @
21,3620         @           @           @           @           @           @           @           @
21,3630         @           @           @           @           @           @           @           @

21,3640         @           @           @           @           @           @           @           @
21,3650         @           @           @           @           @           @           @           @
21,3660         @           @           @           @           @           @           @           @
21,3670         @           @           @           @           @           @           @           @

21,3700         @           @           @           @           @           @           @           @
21,3710         @           @           @           @           @           @           @           @
21,3720         @           @           @           @           @           @           @           @
21,3730         @           @           @           @           @           @           @           @

21,3740         @           @           @           @           @           @           @           @
21,3750         @           @           @           @           @           @           @           @
21,3760         @           @           @           @           @           @           @           @
21,3770         @           @           @           @           @           @           @           @
```

OCTAL LISTING OF PARAGRAPH # 134, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
23,2000      22765 0     37651 1     00006 1     06001 0     54765 1     77651 0     00006 1     12146 1
23,2010      37656 0     54065 0     50000 1     11476 1     12037 0     12017 1     12037 0     50065 1
23,2020      41476 1     50065 1     57473 0     50065 1     61476 0     00006 1     77643 0     50065 1
23,2030      54050 0     10065 0     12011 1     33405 0     00006 1     05014 1     12146 1     67657 1

23,2040      40000 0     65040 0     00006 1     62045 1     12017 1     50065 1     11476 1     35040 0
23,2050      12052 0     45040 1     50065 1     55476 1     12017 1     33072 1     54030 0     22016 0
23,2060      00006 1     22012 1     00006 1     00031 0     40000 0     77700 0     00006 1     13124 1
23,2070      00006 1     31602 1     52346 1     30032 0     54001 1     00006 1     21431 1     23431 0

23,2100      00006 1     77651 0     22066 1     30033 1     54001 1     00006 1     21432 1     23432 0
23,2110      00006 1     77651 0     31404 0     00006 1     70001 1     60066 1     00006 1     71655 1
23,2120      57416 0     00006 1     73066 0     61615 1     27416 1     04177 1     37656 0     54073 1
23,2130      50073 0     30774 0     00006 1     50073 0     21673 0     10000 0     67657 1     12141 0

23,2140      40000 0     50073 0     54774 1     10073 1     12127 0     12000 1     01613 1     33361 0
23,2150      55613 0     37665 0     55615 0     31625 1     63071 1     10000 0     02167 0     14606 1
23,2160      02167 0     41615 0     27416 1     37665 0     55615 0     14606 1  C: 20000 0     67657 1
23,2170      00006 1     77653 1     30001 0     00006 1     73074 0     55625 0     31655 0     62166 1

23,2200      00006 1     71625 0     00006 1     77654 0     31627 0     00006 1     70001 1     00006 1
23,2210      71624 1     23615 1     00002 0     37647 0     70765 1     00006 1     12220 1     12617 1
23,2220      37646 1     70765 1     00006 1     12305 1     30773 1     00006 1     12260 0     43102 0
23,2230      55505 1     55625 0     37655 0     00006 1     02031 1     00006 1     12251 1     37654 1

23,2240      00006 1     02031 1     00006 1     12253 0     10773 0     54773 0     00006 1     12277 0
23,2250      12612 1     37657 1     12254 1     47657 0     55440 1     37665 0     54773 0     12462 1
23,2260      00006 1     00031 0     40000 0     73103 1     00006 1     12267 1     12612 1     37654 1
23,2270      70765 1     00006 1     12277 0     47654 0     70765 1     54765 1     12612 1     37654 1

23,2300      26765 1     37644 0     00006 1     05013 0     12612 1     37641 0     00006 1     02031 1
23,2310      00006 1     12346 0     37657 1     70765 1     00006 1     12617 1     37643 1     00006 1
23,2320      02031 1     00006 1     12417 0     11416 1     12330 1     12334 0     12330 1     12334 0
23,2330      61506 0     00006 1     62334 1     12417 0     47657 0     70765 1     54765 1     30032 0

23,2340      54774 1     30033 1     54775 0     30034 0     54776 0     12612 1     37657 1     70765 1
23,2350      00006 1     12371 1     30043 0     00006 1     77647 1     30001 0     00006 1     73073 1
23,2360      55441 0     37665 0     54043 1     54042 0     54044 0     33111 0     00006 1     05013 0
23,2370      12421 0     24765 0     37656 0     00006 1     02030 0     00006 1     12403 0     33076 0
```

OCTAL LISTING OF PARAGRAPH # 135, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
23,2400      55507 0      33075 0      12406 0      33077 1      55507 0      33100 0      55506 1      37665 0
23,2410      54043 1      54042 0      54044 0      33111 0      00006 1      05013 0      12612 1      37665 0
23,2420      55441 0      41416 1      61441 1      55440 1      10000 0      12431 1      12612 1      12431 1
23,2430      12612 1      67657 1      55472 0      04177 1      31506 0      61472 1      00006 1      62612 0

23,2440      41472 0      00006 1      61507 1      00006 1      62537 1      31472 1      00006 1      71444 0
23,2450      00006 1      77654 0      30001 0      00006 1      73101 0      55625 0      55505 1      63102 1
23,2460      00006 1      62612 0      00006 1      00006 1      00006 1      12471 0      33067 0      27505 1
23,2470      12500 1      33070 0      27505 1      37653 0      22765 0      00006 1      06001 0      54765 1

23,2500      11440 1      37653 0      12504 0      12521 1      70765 1      00006 1      12514 1      37664 1
23,2510      04222 1      37647 0      55502 0      12676 0      33110 1      04222 1      37647 0      55502 0
23,2520      12676 0      37653 0      70765 1      00006 1      12532 0      33107 1      04222 1      37647 0
23,2530      55502 0      12700 0      33106 0      04222 1      37647 0      55502 0      12700 0      31472 1

23,2540      00006 1      71444 0      00006 1      77655 1      30001 0      00006 1      73101 0      55625 0
23,2550      55505 1      41440 1      00006 1      62573 1      00006 1      00006 1      00006 1      12563 1
23,2560      33067 0      27505 1      12565 1      33070 0      27505 1      33105 0      04222 1      37647 0
23,2570      55502 0      47655 1      12701 1      00006 1      00006 1      00006 1      12602 0      33067 0

23,2600      27505 1      12604 0      33070 0      27505 1      33104 1      04222 1      37647 0      55502 0
23,2610      37655 0      12701 1      37665 0      55615 0      55505 1      04222 1      14606 1      30033 1
23,2620      00006 1      20775 0      00006 1      71404 1      57411 1      30032 0      00006 1      20774 1
23,2630      27411 0      55476 1      31444 1      55471 0      04177 1      41426 1      61416 0      55423 1

23,2640      04156 1   C: 51525 1      00006 1      12612 1      10000 0      63112 0      12650 1      63112 0
23,2650      00006 1      62661 1      37637 1      55470 1      31444 1      00006 1      77642 1      55471 0
23,2660      12663 1      47637 0      55470 1      04177 1      33114 0      04162 0      12612 1      55625 0
23,2670      11470 1      31625 1      12550 1      31625 1      55505 1      12462 1      37656 0      12701 1

23,2700      47656 1      55624 1      31622 0      00006 1      71627 1      00006 1      71624 1      23615 1
23,2710      41505 1      63065 1      00006 1      64606 0      33113 1      55613 0      10031 1      12742 0
23,2720      12724 0      12742 0      04203 1      12716 1      31505 0      54031 1      37641 0      00006 1
23,2730      05013 0      31502 1      54770 0      37665 0      57504 1      54766 1      37665 0      57503 0

23,2740      54771 1      14606 1      10766 1      13023 1      41505 1      60031 0      10000 0      67657 1
23,2750      12765 0      12752 1      67657 1      54766 1      31502 1      54771 1      37665 0      57504 1
23,2760      54767 0      37665 0      57503 0      54772 1      14606 1      54766 1      31505 0      54031 1
23,2770      31502 1      56770 1      54771 1      41504 0      00006 1      14606 1      60766 0      10000 0
```

OCTAL LISTING OF PARAGRAPH # 136, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
23,3000        67657 1     13012 0     13003 0     67657 1     54767 0     37665 0     55504 0     57503 0
23,3010        54772 1     14606 1     54767 0     37665 0     57504 1     54766 1     37665 0     57503 0
23,3020        56771 0     54772 1     14606 1     41505 1     60031 0     60766 0     10000 0     67657 1
23,3030        13037 1     13032 1     67657 1     54767 0     31502 1     54772 1     14606 1     54001 1

23,3040        41505 1     60031 0     10000 0     67657 1     13054 1     13046 1     67657 1     54766 1
23,3050        30001 0     54767 0     31502 1     13062 1     56766 0     54767 0     31505 0     54031 1
23,3060        31502 1     56770 1     56771 0     56772 0     14606 1  C: 00360 1  C: 20000 0  C: 77767 1
23,3070     C: 00013 0  C: 77537 0  C: 37775 0  C: 34362 1  C: 24366 1  C: 77555 1  C: 77001 0  C: 76447 1

23,3100     C: 77223 1  C: 31000 0  C: 77763 0  C: 00077 1  C: 00125 1  C: 00252 1  C: 00012 1  C: 00240 1
23,3110     C: 00120 1  C: 00600 1  C: 71462 1  C: 02147 1  C: 52000 0     22016 0     33357 0     54345 1
23,3120        33123 1     54030 0     14610 0  C: 37634 1     00006 1     33360 1     52346 1     37665 0
23,3130        00006 1     01005 0     00006 1     01006 0     43140 0     00006 1     03012 1     14606 1

23,3140     C: 07400 1     22016 0     00006 1     22012 1     37652 1     70367 1     10000 0     13354 1
23,3150        37654 1     67653 0     00006 1     02012 0     10000 0     13354 1     37646 1     00006 1
23,3160        02030 0     10000 0     13354 1     37643 1     00006 1     02031 1     00006 1     13175 0
23,3170        37642 0     00006 1     02031 1     10000 0     13354 1     37665 0     54031 1     55545 0

23,3200        55546 0     55473 1     55474 0     55475 1     55476 1     55477 0     55500 1     54766 1
23,3210        54767 0     54773 0     55615 0     55616 0     55617 1     55642 1     55643 0     55512 1
23,3220        55513 0     54066 0     55416 1     55417 0     55421 0     55426 1     55427 0     55430 0
23,3230        55626 0     55620 0     55621 1     33375 0     55464 1     33377 1     55465 0     30032 0

23,3240        55431 1     54774 1     30033 1     55432 1     55433 0     54775 0     30034 0     55434 1
23,3250        54776 0     37652 1     00006 1     05012 1     33361 0     55613 0     33410 1     55622 1
23,3260        55623 0     33400 0     55655 1     33401 1     55656 1     37657 1     04536 0  C: 03525 0
23,3270     C: 52006 0     37657 1     04536 0  C: 03536 1  C: 52006 0     37657 1     04536 0  C: 03547 1

23,3300     C: 52006 0     33403 0     00006 1     71526 0     00006 1     71533 1     52066 0     00006 1
23,3310        30066 1     00006 1     11463 0     55543 0     52066 0     00006 1     11462 1     55541 1
23,3320        00006 1     73404 0     55535 1     00006 1     70000 0     55536 1     31543 1     00006 1
23,3330        73404 0     55537 0     00006 1     70000 0     55540 0     33406 0     55651 0     55652 0

23,3340        55653 1     55654 0     55650 1     33407 1     55646 0     55647 1     00006 1     33372 1
23,3350        53602 0     00006 1     33370 0     52346 1     33373 0     54030 0     14606 1  C: 03141 0
23,3360     C: 46006 0  C: 02213 0     33402 1     55655 1     55656 1     14602 0  C: 26501 1  C: 02055 0
23,3370     C: 46006 0  C: 02544 0  C: 54006 0  C: 37766 1  C: 00033 1  C: 23712 1  C: 00022 1  C: 25705 1
```

```
OCTAL LISTING OF PARAGRAPH # 137, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

23,3400      C: 24000 1   C: 15146 0   C: 12000 1   C: 02215 0   C: 23146 0   C: 70000 0   C: 11643 0   C: 00033 1
23,3410      C: 02315 1      03411 0      03412 0 CKSM 51626 1        @            @            @            @
23,3420           @            @            @            @            @            @            @            @
23,3430           @            @            @            @            @            @            @            @

23,3440           @            @            @            @            @            @            @            @
23,3450           @            @            @            @            @            @            @            @
23,3460           @            @            @            @            @            @            @            @
23,3470           @            @            @            @            @            @            @            @

23,3500           @            @            @            @            @            @            @            @
23,3510           @            @            @            @            @            @            @            @
23,3520           @            @            @            @            @            @            @            @
23,3530           @            @            @            @            @            @            @            @

23,3540           @            @            @            @            @            @            @            @
23,3550           @            @            @            @            @            @            @            @
23,3560           @            @            @            @            @            @            @            @
23,3570           @            @            @            @            @            @            @            @

23,3600           @            @            @            @            @            @            @            @
23,3610           @            @            @            @            @            @            @            @
23,3620           @            @            @            @            @            @            @            @
23,3630           @            @            @            @            @            @            @            @

23,3640           @            @            @            @            @            @            @            @
23,3650           @            @            @            @            @            @            @            @
23,3660           @            @            @            @            @            @            @            @
23,3670           @            @            @            @            @            @            @            @

23,3700           @            @            @            @            @            @            @            @
23,3710           @            @            @            @            @            @            @            @
23,3720           @            @            @            @            @            @            @            @
23,3730           @            @            @            @            @            @            @            @

23,3740           @            @            @            @            @            @            @            @
23,3750           @            @            @            @            @            @            @            @
23,3760           @            @            @            @            @            @            @            @
23,3770           @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 140, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

24,2000    C: 02555 0   C: 54006 0      32705 1      54030 0      22016 0      00006 1      22012 1      00006 1
24,2010       32001 1      52346 1      30033 1      54001 1      00006 1      21433 0      23433 1      00006 1
24,2020       77651 0      22065 1      30034 0      54001 1      00006 1      21434 1      23434 0      00006 1
24,2030       77651 0      22066 1      31406 1      00006 1      70065 0      54070 1      31403 1      00006 1

24,2040       70066 0      26070 1      31405 1      00006 1      70065 0      56066 1      00006 1      71401 1
24,2050       26066 0      00006 1      71656 1      57417 1      00006 1      71657 0      61616 1      61642 0
24,2060       27417 0      30070 0      00006 1      71656 1      57421 1      00006 1      71657 0      61617 0
24,2070       61643 1      27421 0      01614 0      32164 0      55614 1      37665 0      55616 0      55617 1

24,2100       31626 1      62721 1      10000 0      02113 0      14606 1      02113 0      41616 0      27417 0
24,2110       41617 1      27421 0      14606 1      67657 1      00006 1      77653 1      30001 0      00006 1
24,2120       72722 0      55626 0      00006 1      71620 0      30001 0      00006 1      71630 1      55616 0
24,2130       27640 0      31626 1      00006 1      71621 1      30001 0      00006 1      71631 0      55617 1

24,2140       27641 1      31656 0      00006 1      71626 0      61660 0      00006 1      77654 0      22065 1
24,2150       31616 1      00006 1      70065 0      55616 0      31617 0      00006 1      70065 0      55617 1
24,2160       37665 0      55620 0      55621 1      00002 0   C: 02165 1      37643 1      00006 1      02031 1
24,2170       00006 1      12205 0      37642 0      00006 1      02031 1      00006 1      12743 1      00006 1

24,2200       32204 0      52346 1      14606 1   C: 03141 0   C: 46006 0      37646 1      70765 1      00006 1
24,2210       12250 0      30773 1      00006 1      12504 0      32713 0      55514 1      37657 1      00006 1
24,2220       02031 1      00006 1      13453 1      37656 0      00006 1      02031 1      00006 1      13271 1
24,2230       37653 0      00006 1      02031 1      00006 1      13433 1      37652 1      00006 1      02031 1

24,2240       00006 1      13224 1      12504 0      32702 0      55626 0      37665 0      54773 0      12554 0
24,2250       37641 0      00006 1      02031 1      00006 1      12317 1      37657 1      70765 1      00006 1
24,2260       62743 0      31416 0      00006 1      70000 0      52066 0      31417 1      00006 1      70000 0
24,2270       20066 0      31421 1      00006 1      70000 0      20066 0      42707 1      60065 1      00006 1

24,2300       62306 0      31417 1      55424 0      31421 1      55425 1      12352 0      47657 0      70765 1
24,2310       54765 1      30032 0      54774 1      30033 1      54775 0      30034 0      54776 0      37657 1
24,2320       70765 1      00006 1      12504 0      30042 1      00006 1      77647 1      32714 1      00006 1
24,2330       70001 1      61417 1      55424 0      30044 1      00006 1      77647 1      32714 1      00006 1

24,2340       70001 1      61421 1      55425 1      37665 0      54043 1      54042 0      54044 0      32710 0
24,2350       00006 1      05013 0      32734 0      55514 1      11424 0      12416 1      12360 1      12365 1
24,2360       11425 1      12445 1      12504 0      12456 0      12504 0      61506 0      00006 1      62360 0
24,2370       11425 1      12402 1      12374 1      12407 1      41424 0      55443 1      61507 1      00006 1
```

OCTAL LISTING OF PARAGRAPH # 141, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
24,2400        63453 0      13447 1      61506 0      00006 1      62374 0      03656 1      13360 0      61506 0
24,2410        00006 1      62374 0      03652 0      00006 1      61425 0      13405 1      61506 0      00006 1
24,2420        62360 0      11425 1      12433 0      12425 1      12440 1      31424 1      55443 1      61507 1
24,2430        00006 1      63271 0      13265 1      61506 0      00006 1      62425 0      03652 0      13245 0

24,2440        61506 0      00006 1      62425 0      03656 1      13312 0      61506 0      00006 1      62504 1
24,2450        31425 0      55443 1      61507 1      00006 1      63224 0      13220 0      61506 0      00006 1
24,2460        62504 1      41425 1      55443 1      61507 1      00006 1      63433 0      13427 1      11443 1
24,2470        67657 1      12473 1      67657 1      00006 1      71471 0      00006 1      77654 0      30001 0

24,2500        00006 1      72703 0      55626 0      12554 0      37665 0      55504 0      55503 1      37652 1
24,2510        70765 1      00006 1      12516 0      32723 0      04225 0      14606 1      37651 1      00006 1
24,2520        02031 1      00006 1      12532 0      37650 0      00006 1      02031 1      00006 1      12543 0
24,2530        37665 0      12514 1      32724 1      00006 1      06032 0      00006 1      12541 1      32726 0

24,2540        12514 1      32725 0      12514 1      32727 1      00006 1      06032 0      00006 1      12552 0
24,2550        32730 1      12514 1      32731 0      12514 1      41626 0      62702 0      00006 1      62567 1
24,2560        37665 0      55505 1      55616 0      55617 1      31502 1      04225 0      14606 1      31626 1
24,2570        55505 1      62701 0      00006 1      62630 0      31630 0      00006 1      71620 0      30001 0

24,2600        54065 0      00006 1      71623 0      55616 0      30065 1      00006 1      72627 1      27640 0
24,2610        31631 1      00006 1      71621 1      30001 0      54065 0      00006 1      71623 0      55617 1
24,2620        30065 1      00006 1      72627 1      27641 1      31501 1      12514 1   C: 02073 1   C: 03146 1
24,2630        32626 1      55614 1      31501 1      00006 1      02005 0      00006 1      12663 1      67641 0

24,2640        00006 1      61501 1      54001 1      00006 1      12670 0      31502 1      77637 0      00006 1
24,2650        12654 0      32712 1      27505 1      12674 1      40001 1      67641 0      57502 1      55503 1
24,2660        32712 1      55504 0      12674 1      32712 1      27505 1      37665 0      55504 0      12674 1
24,2670        32711 1      27505 1      37665 0      55504 0      31501 1      04225 0      00006 1      32733 1

24,2700        52006 0   C: 77417 0   C: 00014 1   C: 31000 0   C: 37776 0   C: 37775 0   C: 37773 0   C: 00010 0
24,2710     C: 00600 1   C: 77765 0   C: 00013 0   C: 02243 0   C: 43415 0   C: 20000 0   C: 02000 0   C: 77557 0
24,2720     C: 00220 1   C: 77537 0   C: 24366 1   C: 40252 0   C: 00201 1   C: 40042 0   C: 40210 0   C: 00104 1
24,2730     C: 40104 0   C: 40021 0   C: 02716 0   C: 46006 0   C: 02467 0      32742 1      54345 1      14606 1

24,2740     C: 07400 1   C: 03644 1   C: 02000 0      40765 1      77642 1      10000 0      13025 1      30765 0
24,2750        77655 1      10000 0      12771 0      00006 1      30034 0      52776 0      30032 0      54774 1
24,2760        00006 1      31417 1      53427 0      31421 1      55430 0      37655 0      26765 1      14606 1
24,2770     C: 00632 0      37657 1      55672 1      41427 0      00006 1      51672 0      71400 0      54065 0
```

OCTAL LISTING OF PARAGRAPH # 142, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
24,3000      41430 0      00006 1      51672 0      71402 1      60065 1      00006 1      72770 1      54065 0
24,3010      11672 1      13014 0      30065 1      26065 0      10065 0      67657 1      13020 1      40000 0
24,3020      51672 0      55674 1      11672 1      12772 0      55673 0      30033 1      00006 1      20775 0
24,3030      54065 0      00006 1      71405 0      57413 0      30034 0      00006 1      20776 0      54066 0

24,3040      00006 1      71401 1      27413 1      55477 0      30065 1      00006 1      71406 0      57411 1
24,3050      30066 1      00006 1      71403 0      27411 0      55500 1      37656 0      70765 1      10000 0
24,3060      13122 1      00006 1      00005 1      10000 0      13122 1      00006 1      00012 1      72740 1
24,3070      10000 0      13122 1      37657 1      54073 1      60000 1      50000 1      11417 0      63120 1

24,3100      13102 0      63120 1      00006 1      63105 0      13122 1      50073 0      11477 0      63121 0
24,3110      13112 1      63121 0      00006 1      63115 1      13122 1      10073 1      13073 1      12735 0
24,3120   C: 77512 1   C: 77601 0      32741 1      55514 1      04177 1      31662 1      55471 0      41430 0
24,3130      61421 1      55425 1      03525 0      55516 0      53412 0      53414 0      55411 0      31407 0

24,3140      55410 1      31661 1      55471 0      41427 0      61417 1      55424 0      03525 0      55515 0
24,3150      00006 1      13321 0      00006 1      73336 0      61516 1      00006 1      73334 1      55521 1
24,3160      41516 0      00006 1      73336 0      61515 1      00006 1      73334 1      55522 1      61521 0
24,3170      55517 1      41522 1      61521 0      55520 0      31522 0      00006 1      63337 0      31521 0

24,3200      00006 1      63254 1      31520 1      00006 1      63232 1      00006 1      31414 1      53412 0
24,3210      31410 0      55407 1      31652 1      55650 1      33524 1      61516 1      00006 1      63224 0
24,3220      31446 0      55471 0      47663 1      13460 1      11666 1      13220 0      31446 0      55471 0
24,3230      46162 0      13460 1      31653 0      55650 1      31515 1      61516 1      10000 0      63524 1

24,3240      13242 1      63524 1      00006 1      63247 0      03474 0      47664 0      13460 1      11667 0
24,3250      13244 1      03474 0      47655 1      13460 1      31517 0      00006 1      63277 0      31651 1
24,3260      55650 1      33524 1      61515 1      00006 1      63273 1      31445 0      55471 0      46165 1
24,3270      13460 1      11665 1      13265 1      31445 0      55471 0      47656 1      13460 1      31654 1

24,3300      55650 1      41515 0      61516 1      10000 0      63524 1      13307 1      63524 1      00006 1
24,3310      63314 1      03466 0      47657 0      13460 1      11670 0      13311 0      03466 0      37665 0
24,3320      13460 1      31516 1      00006 1      12504 0      00006 1      73335 0      55522 1      31516 1
24,3330      00006 1      73334 1      55521 1      13171 1   C: 35441 0   C: 14176 1   C: 62575 1      31521 0

24,3340      00006 1      63367 0      31517 0      00006 1      63441 0      31654 1      55650 1      41515 0
24,3350      61516 1      10000 0      63524 1      13355 0      63524 1      00006 1      63362 0      03466 0
24,3360      37657 1      13460 1      11670 0      13357 1      03466 0      37656 0      13460 1      31520 1
24,3370      00006 1      63414 0      31653 0      55650 1      31515 1      61516 1      10000 0      63524 1
```

```
OCTAL LISTING OF PARAGRAPH # 143, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

24,3400        13402 0      63524 1      00006 1      63407 1      03474 0      36165 0      13460 1      11667 0
24,3410        13404 0      03474 0      37655 0      13460 1      00006 1      31414 1      53412 0      31410 0
24,3420        55407 1      31652 1      55650 1      33524 1      61516 1      00006 1      63433 0      31446 0
24,3430        55471 0      37664 1      13460 1      11666 1      13427 1      31446 0      55471 0      36162 1

24,3440        13460 1      31651 1      55650 1      33524 1      61515 1      00006 1      63455 0      31445 0
24,3450        55471 0      37663 0      13460 1      11665 1      13447 1      31445 0      55471 0      37654 1
24,3460        55523 0      00006 1      33465 0      52006 0   C: 02216 0   C: 52006 0      31450 1      55471 0
24,3470        41411 0      55411 0      41424 0      13477 1      31447 1      55471 0      31424 1      61425 0

24,3500        00006 1      73523 1      55407 1      00006 1      77655 1      00006 1      13510 1      13672 0
24,3510        30001 0      55407 1      00006 1      70000 0      55412 0      31411 1      61413 0      00006 1
24,3520        73523 1      55411 0      00002 0   C: 26501 1   C: 71777 0      55407 1      00006 1      77655 1
24,3530        00006 1      13533 0      13666 0      10001 1      67656 0      13537 1      40000 0      67667 1

24,3540        55440 1      55407 1      00006 1      70000 0      55412 0      00006 1      71471 0      00006 1
24,3550        61415 0      55451 1      31412 1      00006 1      71650 1      61415 0      55467 1      11407 1
24,3560        31411 1      13563 0      13602 1      27451 1      11407 1      11451 1      13573 1      11451 1
24,3570        13606 0      13606 0      13573 1      41440 1      55440 1      31407 0      00006 1      77645 0

24,3600        61451 0      13626 1      41451 1      61411 1      55451 1      13564 1      11451 1      41467 1
24,3610        13612 0      31467 0      61411 1      55467 1      11407 1      11467 1      13623 1      11467 1
24,3620        13625 1      13625 1      13623 1      37665 0      13642 0      31467 0      00006 1      71471 0
24,3630        00006 1      77652 0      00006 1      13641 0      10000 0      37637 1      13642 0      47637 0

24,3640        13642 0      30001 0      00002 0   C: 51644 0      04177 1      33643 0      04162 0      12504 0
24,3650        55626 0      12554 0      31447 1      55471 0      31424 1      13661 1      31450 1      55471 0
24,3660        41424 0      61425 0      00006 1      73523 1      55443 1      00002 0      41407 1      61423 0
24,3670        00006 1      13703 1      03715 1      00006 1      71424 0      55424 0      31425 0      00006 1

24,3700        71407 1      55425 1      12352 0      03715 1      00006 1      71423 1      55423 1      55440 1
24,3710        00006 1      33714 0      52006 0   C: 02424 1   C: 46006 0      33722 0      00006 1      11407 1
24,3720        55407 1      00002 0   C: 07313 1      03723 1      03724 0 CKSM 76723 0         @            @
24,3730           @            @            @            @            @            @            @            @

24,3740           @            @            @            @            @            @            @            @
24,3750           @            @            @            @            @            @            @            @
24,3760           @            @            @            @            @            @            @            @
24,3770           @            @            @            @            @            @            @            @
```

```
OCTAL LISTING OF PARAGRAPH # 144, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

25,2000        41407 1     00006 1     62006 0     55407 1     41411 0     55411 0     31412 1     00006 1
25,2010        71471 0     00006 1     77642 1     61411 1     00006 1     61415 0     55454 1     00006 1
25,2020        62070 1     31407 0     00006 1     71471 0     55521 1     62205 1     00006 1     62032 1
25,2030        37642 0     12057 0     41454 1     61647 0     00006 1     62116 0     31521 0     62211 1

25,2040        00006 1     62044 0     62210 0     12164 1     42067 0     60076 0     00006 1     12061 0
25,2050        31620 1     00006 1     12063 1     31621 0     00006 1     12065 1     32206 1     24076 0
25,2060        00002 0     55416 1     12056 1     55421 0     12056 1     55417 0     12056 1  C: 02666 0
25,2070        31412 1     00006 1     71650 1     61411 1     61415 0     61646 1     00006 1     62101 0

25,2100        00002 0     42212 0     61407 0     00006 1     62106 1     00002 0     41407 1     00006 1
25,2110        71471 0     55521 1     41454 1     61411 1     61411 1     61647 0     55454 1     31471 1
25,2120        00006 1     77642 1     61650 0     55456 0     00006 1     72213 1     61454 0     00006 1
25,2130        62170 0     31454 0     00006 1     11456 0     00006 1     71471 0     00006 1     71471 0

25,2140        55522 1     32205 1     61521 0     00006 1     70000 0     61522 0     00006 1     62030 0
25,2150        32207 0     61521 0     00006 1     62175 0     00006 1     23517 0     04177 1     41522 1
25,2160        04275 0     00006 1     23517 0     61521 0     60000 1     00006 1     72215 1     12057 0
25,2170        32212 1     62214 1     00006 1     71471 0     12163 0     32207 0     61521 0     00006 1

25,2200        70000 0     61522 0     00006 1     62154 0     00002 0  C: 77631 0  C: 00014 1  C: 77767 1
25,2210     C: 00030 1  C: 77753 0  C: 34344 0  C: 31221 1  C: 01552 1  C: 31000 0     37651 1     00006 1
25,2220        02031 1     00006 1     12245 1     37650 0     00006 1     02031 1     00006 1     12242 0
25,2230        30765 0     77650 1     00006 1     12237 1     51523 1     33013 0     12247 0     51523 1

25,2240        32773 0     12247 0     51523 1     33053 1     12247 0     51523 1     33033 1     55523 0
25,2250        51523 1     32364 1     00006 1     77651 0     77663 1     55524 1     12262 1     55524 1
25,2260        00006 1     27523 0     51523 1     32364 1     54001 1     51523 1     32564 1     00006 1
25,2270        05001 0     71512 1     10000 0     12275 1     12301 0     11524 1     12257 1     00006 1

25,2300        27523 0     51523 1     32364 1     75235 1     67641 0     55501 0     51523 1     32364 1
25,2310        00006 1     77654 0     10000 0     12315 0     12326 0     10000 0     12322 1     31471 1
25,2320        60000 1     12325 0     31471 1     00006 1     77642 1     55471 0     51523 1     32564 1
25,2330        00006 1     77654 0     50000 1     32355 0     55620 0     30001 0     00006 1     77654 0

25,2340        50000 1     32355 0     55621 1     30001 0     00006 1     77647 1     67641 0     55502 0
25,2350        32354 1     54001 1     31514 0     52006 0  C: 50006 1  C: 77773 1  C: 77775 1  C: 77776 1
25,2360     C: 00000 1  C: 00001 0  C: 00002 0  C: 00004 0  C: 00220 1  C: 00006 1  C: 00602 0  C: 10226 0
25,2370     C: 11626 0  C: 00201 1  C: 00044 1  C: 00640 0  C: 10245 0  C: 11645 0  C: 00140 1  C: 00011 1
```

OCTAL LISTING OF PARAGRAPH # 145, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
25,2400     C: 00450 0   C: 10151 0   C: 11551 0   C: 00102 1   C: 00030 1   C: 00412 0   C: 10132 0   C: 11532 0
25,2410     C: 00220 1   C: 00006 1   C: 00424 0   C: 10226 0   C: 11626 0   C: 00044 1   C: 00201 1   C: 00405 0
25,2420     C: 10245 0   C: 11645 0   C: 00140 1   C: 00011 1   C: 00501 0   C: 10151 0   C: 11551 0   C: 00030 1
25,2430     C: 00102 1   C: 00520 0   C: 10132 0   C: 11532 0   C: 04046 1   C: 04242 1   C: 04600 0   C: 00204 1

25,2440     C: 01604 1   C: 04142 1   C: 04052 1   C: 04410 0   C: 00110 1   C: 01510 1   C: 04211 1   C: 04250 1
25,2450     C: 04440 0   C: 00041 1   C: 01441 1   C: 04230 1   C: 04212 1   C: 04402 0   C: 00022 1   C: 01422 1
25,2460     C: 04221 1   C: 04025 1   C: 04404 0   C: 00204 1   C: 01604 1   C: 04031 1   C: 04121 1   C: 04500 0
25,2470     C: 00110 1   C: 01510 1   C: 04144 1   C: 04105 1   C: 04401 0   C: 00041 1   C: 01441 1   C: 04106 1

25,2500     C: 04124 1   C: 04420 0   C: 00022 1   C: 01422 1   C: 04004 1   C: 04200 1   C: 00604 0   C: 04001 1
25,2510     C: 04040 1   C: 00441 0   C: 04100 1   C: 04010 1   C: 00510 0   C: 04020 1   C: 04002 1   C: 00422 0
25,2520     C: 00024 1   C: 00220 1   C: 00006 1   C: 01202 0   C: 00005 1   C: 00201 1   C: 00044 1   C: 01240 0
25,2530     C: 00101 1   C: 00140 1   C: 00011 1   C: 01050 0   C: 00120 1   C: 00102 1   C: 00030 1   C: 01012 0

25,2540     C: 00024 1   C: 00202 1   C: 00220 1   C: 01006 0   C: 11626 0   C: 00005 1   C: 00240 1   C: 00201 1
25,2550     C: 01044 0   C: 11645 0   C: 00050 1   C: 00101 1   C: 00140 1   C: 01011 0   C: 11551 0   C: 00120 1
25,2560     C: 00012 1   C: 00102 1   C: 01030 0   C: 11532 0   C: 25610 1   C: 25442 1   C: 25400 1   C: 31610 1
25,2570     C: 31442 1   C: 16610 1   C: 16442 1   C: 16400 1   C: 17210 1   C: 17042 1   C: 05442 0   C: 05610 0

25,2600     C: 05400 0   C: 01610 1   C: 01442 1   C: 14442 0   C: 14610 0   C: 14400 0   C: 14210 1   C: 14042 1
25,2610     C: 25421 1   C: 25504 1   C: 25400 1   C: 31504 1   C: 31421 1   C: 16504 1   C: 16421 1   C: 16400 1
25,2620     C: 17104 1   C: 17021 1   C: 05504 0   C: 05421 0   C: 05400 0   C: 01504 1   C: 01421 1   C: 14421 0
25,2630     C: 14504 0   C: 14400 0   C: 14104 1   C: 14021 1   C: 22042 1   C: 22042 1   C: 22210 1   C: 26610 1

25,2640     C: 26442 1   C: 11042 1   C: 11042 1   C: 11210 1   C: 04610 1   C: 04442 1   C: 12210 1   C: 12210 1
25,2650     C: 12042 1   C: 06442 0   C: 06610 0   C: 21210 1   C: 21210 1   C: 21042 1   C: 24442 0   C: 24610 0
25,2660     C: 22021 1   C: 22021 1   C: 22104 1   C: 26504 1   C: 26421 1   C: 11021 1   C: 11021 1   C: 11104 1
25,2670     C: 04504 1   C: 04421 1   C: 12104 1   C: 12104 1   C: 12021 1   C: 06421 0   C: 06504 0   C: 21104 1

25,2700     C: 21104 1   C: 21021 1   C: 24421 0   C: 24504 0   C: 22000 1   C: 22000 1   C: 26400 1   C: 12000 1
25,2710     C: 12000 1   C: 06400 0   C: 11000 1   C: 11000 1   C: 04400 1   C: 21000 1   C: 21000 1   C: 24400 0
25,2720     C: 25400 1   C: 25400 1   C: 25400 1   C: 25400 1   C: 16400 1   C: 16400 1   C: 16400 1   C: 16400 1
25,2730     C: 05400 0   C: 05400 0   C: 05400 0   C: 05400 0   C: 14400 0   C: 14400 0   C: 14400 0   C: 14400 0

25,2740     C: 25400 1   C: 25400 1   C: 25400 1   C: 25400 1   C: 31400 1   C: 16400 1   C: 16400 1   C: 16400 1
25,2750     C: 16400 1   C: 17000 1   C: 05400 0   C: 05400 0   C: 05400 0   C: 05400 0   C: 01400 1   C: 14400 0
25,2760     C: 14400 0   C: 14400 0   C: 14400 0   C: 14000 1   C: 00177 0   C: 00176 1   C: 00130 0   C: 00130 0
25,2770     C: 00172 0   C: 00171 0   C: 00125 1   C: 00125 1   C: 00133 0   C: 00133 0   C: 00122 0   C: 00122 0
```

OCTAL LISTING OF PARAGRAPH # 146, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
25,3000     C: 00165 0   C: 00164 1   C: 00160 0   C: 00157 1   C: 00177 0   C: 00153 0   C: 00130 0   C: 00130 0
25,3010     C: 00172 0   C: 00147 0   C: 00125 1   C: 00125 1   C: 00133 0   C: 00133 0   C: 00122 0   C: 00122 0
25,3020     C: 00165 0   C: 00143 1   C: 00160 0   C: 00137 1   C: 00023 0   C: 00021 1   C: 00061 0   C: 00057 0
25,3030     C: 00016 0   C: 00014 1   C: 00066 1   C: 00064 0   C: 00073 0   C: 00071 1   C: 00054 0   C: 00052 0

25,3040     C: 00011 1   C: 00007 0   C: 00004 0   C: 00002 0   C: 00047 1   C: 00045 0   C: 00105 0   C: 00103 0
25,3050     C: 00042 1   C: 00040 0   C: 00112 0   C: 00110 1   C: 00117 0   C: 00115 1   C: 00100 0   C: 00076 0
25,3060     C: 00035 1   C: 00033 1   C: 00030 1   C: 00026 0      37650 0      70765 1      00006 1      13325 1
25,3070        31671 0      00006 1      13275 0      63367 0      00006 1      63077 1      13301 1      33410 1

25,3100        00006 1      71671 1      37643 1      60001 0      54066 0      33411 0      00006 1      71671 1
25,3110        33412 0      60001 0      54065 0      40000 0      67637 1      55657 0      00006 1      77644 1
25,3120        55660 1      30065 1      00006 1      73403 1      55656 1      40065 0      00006 1      73375 1
25,3130        63376 0      54065 0      30066 1      00006 1      71634 0      55634 0      30066 1      00006 1

25,3140        71635 1      55635 1      40066 0      00006 1      77643 0      67643 1      54066 0      41417 0
25,3150        57644 0      00006 1      61640 1      61417 1      00006 1      70066 0      27634 0      41421 0
25,3160        57645 1      00006 1      61641 0      61421 1      00006 1      70066 0      27635 1      30065 1
25,3170        00006 1      71634 0      55642 1      30065 1      00006 1      71635 1      55643 0      31634 1

25,3200        61635 0      00006 1      73377 0      55636 1      41634 0      61635 0      00006 1      73377 0
25,3210        55637 0      36165 0      54065 0      50065 1      11634 0      67657 I      13220 0      67657 1
25,3220        50065 1      54070 1      63400 0      00006 1      63263 0      63413 1      54066 0      37651 1
25,3230        22007 0      00006 1      10066 0      50065 1      55651 0      33400 0      00006 1      50065 1

25,3240        60070 0      50065 1      61630 0      00006 1      63265 0      37665 0      50065 1      55665 1
25,3250        50065 1      31445 0      00006 1      77642 1      50065 1      55661 0      10065 0      13261 0
25,3260        13313 1      54065 0      13213 0      33402 1      13233 1      37637 1      50065 1      55665 1
25,3270        50065 1      31445 0      00006 1      77643 0      13254 0      37656 0      55671 1      37665 0

25,3300        13104 0      37665 0      22007 0      53660 1      33403 0      55656 1      33375 0      54065 0
25,3310        33404 1      54066 0      13132 0      33405 0      04536 0   C: 03064 0   C: 52006 0      37656 0
25,3320        27671 1      37665 0      55640 0      55641 1      14602 0      33406 0      55656 1      00006 1
25,3330        33415 1      53660 1      37655 0      70765 1      67655 0      54765 1      33402 1      55650 1

25,3340        55651 0      55652 0      55653 1      55654 0      00006 1      31446 0      53662 0      00006 1
25,3350        31450 1      53664 0      33407 1      55647 1      55646 0      37665 0      55634 0      55635 1
25,3360        55642 1      55643 0      55665 1      55666 1      55667 0      55670 0      14602 0   C: 77160 0
25,3370     C: 00024 1   C: 20510 1   C: 77537 0   C: 00047 1   C: 13555 0   C: 03146 1   C: 06315 0   C: 26501 1
```

OCTAL LISTING OF PARAGRAPH # 147, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
25,3400    C: 77456 0    C: 00641 1    C: 11643 0    C: 24000 1    C: 30000 1    C: 00310 0    C: 12000 1    C: 00033 1
25,3410    C: 00024 1    C: 00027 1    C: 16051 1    C: 00321 1    C: 20000 0    C: 02000 0       37665 0       55512 1
25,3420       55513 0       00006 1       00032 0       55511 1       40000 0       00006 1       77651 0       37665 0
25,3430       54065 0       30001 0       13435 1       67657 1       24065 1       60000 1       54066 0       13434 0

25,3440       50065 1       03445 1       10066 0       13433 1       14606 1       13455 1       13462 0       13467 0
25,3450       13474 1       13501 1       13506 0       13513 1       13520 1       37652 1       27512 1       37654 1
25,3460       27513 0       00002 0       37653 0       27512 1       37653 0       27513 0       00002 0       37651 1
25,3470       27512 1       37655 0       27513 0       00002 0       37650 0       27512 1       37650 0       27513 0

25,3500       00002 0       37654 1       27512 1       37657 1       27513 0       00002 0       37657 1       27512 1
25,3510       37656 0       27513 0       00002 0       37655 0       27512 1       37652 1       27513 0       00002 0
25,3520       37656 0       27512 1       37651 1       27513 0       00002 0       03570 0       03563 1       00006 1
25,3530       27461 1       33560 1       04536 0    C: 03525 0    C: 52006 0       14602 0       03604 0       03563 1

25,3540       00006 1       27462 1       33561 0       04536 0    C: 03536 1    C: 52006 0       14602 0       03621 1
25,3550       03563 1       00006 1       27463 0       33562 0       04536 0    C: 03547 1    C: 52006 0       14602 0
25,3560    C: 00310 0    C: 02424 1    C: 00264 1       37650 0       70765 1       10000 0       00002 0       14602 0
25,3570       31461 0       22007 0       00006 1       11464 1       60000 1       55444 0       33660 1       22007 0

25,3600       00006 1       11461 1       55627 1       00002 0       31462 0       22007 0       00006 1       11465 0
25,3610       55661 0       60000 1       55445 1       33661 0       22007 0       00006 1       11462 1       55630 1
25,3620       00002 0       31463 1       22007 0       00006 1       11465 0       55662 0       60000 1       55446 1
25,3630       33661 0       22007 0       00006 1       11463 0       55631 0       31445 0       61446 0       00006 1

25,3640       73377 0       55447 0       31445 0       00006 1       71446 1       00006 1       11447 0       55447 0
25,3650       55450 0       31630 0       61631 1       00006 1       73662 1       55632 0       55633 1       00002 0
25,3660    C: 00050 1    C: 00054 0    C: 13241 1       03663 1       03664 0  CKSM 71304 0        @             @
25,3670        @             @             @             @             @             @             @             @

25,3700        @             @             @             @             @             @             @             @
25,3710        @             @             @             @             @             @             @             @
25,3720        @             @             @             @             @             @             @             @
25,3730        @             @             @             @             @             @             @             @

25,3740        @             @             @             @             @             @             @             @
25,3750        @             @             @             @             @             @             @             @
25,3760        @             @             @             @             @             @             @             @
25,3770        @             @             @             @             @             @             @             @
```

OCTAL LISTING OF PARAGRAPH # 150, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
26,2000       32372 0     54030 0     22016 0     00006 1     22012 1     00006 1     32071 0     52346 1
26,2010       32013 1     55553 1     12032 0  C: 02315 1  C: 02051 1     32372 0     54030 0     22016 0
26,2020       00006 1     22012 1     00006 1     31604 1     52346 1     53604 0     53612 1     53610 0
26,2030       53606 1     53604 0     04177 1     00006 1     30034 0     53550 1     00006 1     00004 0

26,2040       54001 1     00006 1     06004 0     00006 1     12050 1     00006 1     00004 0     54001 1
26,2050       01553 0     40001 1     61552 1     23552 1     00006 1     62060 0     67640 1     67640 1
26,2060       00006 1     77651 0     42367 0     00006 1     70001 1     55551 0     11556 1     12073 0
26,2070    C: 02055 0  C: 46006 0     12104 1     46165 1     27556 1     00006 1     51556 0     32404 0

26,2100       53560 1     51556 0     32405 1     55561 0     37656 0     54073 1     12112 0     37665 0
26,2110       54073 1     04177 1     50073 0     53563 1     52077 0     50073 0     53567 0     52066 0
26,2120       50073 0     53573 0     52071 0     50073 0     31576 1     57577 0     30070 0     00006 1
26,2130       71551 0     00006 1     77646 0     60065 1     00006 1     71551 0     00006 1     77647 1

26,2140       20077 0     31577 0     00006 1     71551 0     54072 0     00006 1     77651 0     60070 0
26,2150       00006 1     71551 0     00006 1     77645 0     20066 0     30072 1     00006 1     77650 1
26,2160       20071 0     00006 1     30077 1     02302 1     31550 0     00006 1     20072 0     55554 0
26,2170       40077 0     60000 1     57555 0     00006 1     31555 0     20001 1     22072 1     00006 1

26,2200       71557 0     20077 0     30072 1     00006 1     71557 0     26077 0     54001 1     12211 0
26,2210       26076 1     31554 1     00006 1     77647 1     22072 1     31555 0     00006 1     77647 1
26,2220       60072 1     22072 1     00006 1     71560 1     20066 0     30072 1     00006 1     71560 1
26,2230       26066 0     54001 1     12234 1     26065 0     31554 1     00006 1     77650 1     22072 1

26,2240       31555 0     00006 1     77650 1     60072 1     22072 1     00006 1     71561 0     20071 0
26,2250       30072 1     00006 1     71561 0     26071 0     54001 1     12257 1     26070 1     52077 0
26,2260       50073 0     53563 1     52066 0     50073 0     53567 0     52071 0     50073 0     53573 0
26,2270       57547 0     57550 0     57547 0     10073 1     12107 1     40345 1     62377 0     00006 1

26,2300       12575 0     14606 1     20001 1     10000 0     67657 1     12307 0     40000 0     54072 0
26,2310       12314 1     50000 1     37640 1     26072 0     00002 0     23552 1     32371 0     55556 1
26,2320       32014 0     55553 1     00006 1     32375 1     53604 0     00006 1     32071 0     53606 1
26,2330       00006 1     32071 0     53612 1     00006 1     32400 1     53610 0     00006 1     32402 0

26,2340       53602 0     31547 0     00006 1     77642 1     53563 1     31550 0     00006 1     77642 1
26,2350       53565 1     37665 0     55566 1     55567 0     55570 0     55571 1     55572 1     55573 0
26,2360       55574 1     55575 0     55576 0     55600 1     55532 0     55534 0     14606 1  C: 24366 1
26,2370    C: 14000 1  C: 00132 1  C: 37776 0  C: 37775 0  C: 02535 0  C: 54006 0  C: 02055 0  C: 02564 1
```

OCTAL LISTING OF PARAGRAPH # 151, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
26,2400     C: 54006 0   C: 02015 1   C: 54006 0   C: 05751 1   C: 00672 1   C: 05362 0   C: 04460 1   C: 00731 1
26,2410     C: 05530 1   C: 04522 0   C: 00745 1   C: 05632 0   C: 04572 0   C: 11602 0   C: 05764 1   C: 04650 0
26,2420     C: 01005 0   C: 06153 0   C: 04735 1   C: 01032 1   C: 06405 0   C: 05027 1   C: 01063 0   C: 06707 1
26,2430     C: 05130 0   C: 01120 0   C: 07270 0   C: 05237 1   C: 01163 1   C: 07742 1   C: 05354 0   C: 01232 0

26,2440     C: 10513 1   C: 05475 1   C: 01306 0   C: 11375 0   C: 05622 1   C: 01367 1   C: 12402 1   C: 05752 1
26,2450     C: 01456 1   C: 13541 0   C: 06101 1   C: 01551 1   C: 15040 1   C: 06225 1   C: 01647 0   C: 16503 0
26,2460     C: 06341 1   C: 01746 0   C: 20244 1   C: 06440 1   C: 02041 0   C: 22055 1   C: 06514 1   C: 02123 0
26,2470     C: 23610 1   C: 06542 1   C: 02166 1   C: 25072 0   C: 06546 0   C: 02205 1   C: 25640 1   C: 06543 0

26,2500     C: 02177 1   C: 25427 1   C: 06564 0   C: 02160 1   C: 24077 1   C: 06671 1   C: 02154 0   C: 21470 1
26,2510     C: 07125 0   C: 02225 0   C: 16256 1   C: 07544 0   C: 02430 1   C: 12624 1   C: 10401 0   C: 03054 0
26,2520     C: 07317 0   C: 11507 0   C: 04070 1   C: 04404 0   C: 13146 0   C: 06020 0   C: 02213 0   C: 15230 1
26,2530     C: 11756 0   C: 00613 0   C: 17670 0   C: 23514 0   C: 00001 0      32373 1      54030 0      22016 0

26,2540        00006 1      32402 0      52346 1      14610 0      32372 0      54030 0      22016 0      00006 1
26,2550        32554 1      52346 1      14610 0   C: 02002 1   C: 50006 1      32372 0      54030 0      22016 0
26,2560        00006 1      32071 0      52346 1      14606 1      32373 1      54030 0      22016 0      00006 1
26,2570        22012 1      00006 1      32402 0      52346 1      12666 1      00006 1      31563 0      02302 1

26,2600        00006 1      20775 0      55477 0      00006 1      31565 0      02302 1      00006 1      20776 0
26,2610        55500 1      00006 1      31500 0      03421 0      53500 1      03431 1      57500 0      31570 1
26,2620        54001 1      31566 0      03421 0      55417 0      31570 1      54001 1      31566 0      03431 1
26,2630        55421 0      31574 0      54001 1      31572 0      03421 0      55420 1      31574 0      54001 1

26,2640        31572 0      03431 1      55422 0      31417 1      00006 1      72664 0      27477 0      31421 1
26,2650        00006 1      72664 0      27500 1      31420 0      00006 1      72665 1      27417 0      31422 1
26,2660        00006 1      72665 1      27421 0      14606 1   C: 00122 0   C: 00051 0      37656 0      70765 1
26,2670        10000 0      12723 1      37657 1      54073 1      50073 0      11477 0      62721 1      12701 1

26,2700        62721 1      00006 1      62704 0      12723 1      30073 0      60000 1      50000 1      11417 0
26,2710        62722 1      12713 1      62722 1      00006 1      62716 0      12723 1      10073 1      12673 0
26,2720        12766 0   C: 77512 1   C: 77423 1      32745 0      54345 1      32746 0      55601 0      00006 1
26,2730        30034 0      53434 1      00006 1      31500 0      57500 0      23477 1      37657 1      04536 0

26,2740     C: 02751 0   C: 54006 0      00006 1      32750 1      52006 0   C: 02555 0   C: 02544 0   C: 03122 0
26,2750     C: 50006 1      37665 0      03442 0      04536 0   C: 03370 0   C: 54006 0      37656 0      03442 0
26,2760        04536 0   C: 03373 0   C: 54006 0      03400 0      14602 0   C: 76504 1      37656 0      54073 1
26,2770        12773 1      37665 0      54073 1      00006 1      50073 0      31536 0      52066 0      00006 1
```

```
OCTAL LISTING OF PARAGRAPH # 152, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

26,3000        50073 0     31420 0     52071 0     30073 0     00006 1     13010 1     31500 0     13011 0
26,3010        31477 1     00006 1     77651 0     22075 0     30065 1     62765 1     00006 1     63033 1
26,3020        37642 0     54076 1     37644 0     54077 0     10070 1     63056 1     13030 0     63056 1
26,3030        00006 1     63047 1     13071 0     30065 1     00006 1     77653 1     22065 1     30065 1

26,3040        00006 1     70000 0     54066 0     37646 1     54076 1     37654 1     13023 1     10071 0
26,3050        63057 0     13053 0     63057 0     00006 1     63060 1     13071 0  C: 76450 1  C: 75120 0
26,3060        30070 0     00006 1     77653 1     22070 0     30071 1     00006 1     77654 0     22071 1
26,3070        13101 0     30076 0     00006 1     77643 0     54076 1     30077 1     00006 1     77652 0

26,3100        54077 0     30075 0     00006 1     70066 0     22074 1     00006 1     70077 0     52075 1
26,3110        00006 1     70077 0     26075 1     30070 0     00006 1     70065 0     22065 1     00006 1
26,3120        70076 1     52066 0     00006 1     70076 1     26066 0     30071 1     00006 1     70000 0
26,3130        52077 0     30071 1     00006 1     63137 1     00006 1     30077 1     13141 1     00006 1

26,3140        40077 0     53531 0     00006 1     30066 1     21531 0     11530 1     13152 0     13151 0
26,3150        13154 0     11531 0     37656 0     13155 1     37665 0     67667 1     54072 0     10072 0
26,3160        13165 1  C: 25253 1     00006 1     40066 0     52066 0     00006 1     30066 1     53531 0
26,3170        00006 1     30077 1     21531 0     30076 0     00006 1     73161 0     52077 0     56001 0

26,3200        00006 1     73161 0     26077 0     54001 1     13206 1     60076 0     52066 0     20077 0
26,3210        30076 0     00006 1     70071 0     52077 0     56001 0     00006 1     70071 0     26077 0
26,3220        54001 1     13223 0     26076 1     52077 0     20075 1     11530 1     13273 0     13231 0
26,3230     C: 26501 1     04177 1     31531 1     04275 0     00006 1     71531 0     00006 1     77650 1

26,3240        56001 0     37665 0     53531 0     13260 1     31530 0     00006 1     77651 0     23530 0
26,3250        37665 0     57531 1     00006 1     77651 0     21531 0     37665 0     55527 1     13300 0
26,3260        47637 0     55527 1     10072 0     33230 0     13266 1     43230 1     13302 1     37637 1
26,3270        55527 1     37652 1     13302 1     64362 1     54000 0     13244 1     37637 1     55527 1

26,3300        31530 0     04275 0     57530 0     00006 1     71530 1     53531 0     00006 1     70001 1
26,3310        27531 0     54001 1     13314 0     27530 1     11527 1     13260 1     13267 0     00006 1
26,3320        31531 1     20075 1     10074 0     13327 0     13326 1     13331 1     10075 1     37656 0
26,3330        13332 1     37665 0     67667 1     50073 0     55532 0     40000 0     00006 1     50073 0

26,3340        71541 1     50073 0     23542 0     10073 1     12771 0     31542 0     00006 1     71400 0
26,3350        55576 0     31544 0     00006 1     71402 1     27576 0     27576 0     31542 0     00006 1
26,3360        71401 1     55600 1     31544 0     00006 1     71403 0     27600 1     03400 0     14606 1
26,3370        37665 0     55532 0     13375 1     37665 0     55534 0     03400 0     14602 0  C: 07400 1
```

```
OCTAL LISTING OF PARAGRAPH # 153, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

26,3400       43377 0       00006 1       02012 0       54073 1       11532 0       37647 0       13410 0       37646 1
26,3410       26073 1       11534 0       37645 1       13415 0       37644 0       26073 1       00006 1       01012 0
26,3420       00002 0       22073 0       00006 1       71405 0       56073 0       00006 1       71401 1       60073 0
26,3430       00002 0       22073 0       00006 1       71406 0       56073 0       00006 1       71403 0       60073 0

26,3440       00002 0    C: 25253 1       54065 0       50065 1       31542 0       00006 1       13511 0       54066 0
26,3450       00006 1       50065 1       71420 1       10000 0       13460 1       13460 1       13466 1       13466 1
26,3460       50065 1       41532 0       50065 1       55532 0       40066 0       54066 0       50065 1       41420 1
26,3470       00006 1       77645 0       00006 1       10066 0       63517 1       10000 0       43516 1       00002 0

26,3500       67657 1       00006 1       73520 1       20001 1       63516 0       40000 0       00006 1       63511 1
26,3510       00002 0       37665 0       50065 1       55532 0       50002 0       00003 1    C: 50437 1    C: 60777 0
26,3520    C: 31000 0       03521 1       03522 1  CKSM 50453 0         @             @             @             @
26,3530         @             @             @             @             @             @             @             @

26,3540         @             @             @             @             @             @             @             @
26,3550         @             @             @             @             @             @             @             @
26,3560         @             @             @             @             @             @             @             @
26,3570         @             @             @             @             @             @             @             @

26,3600         @             @             @             @             @             @             @             @
26,3610         @             @             @             @             @             @             @             @
26,3620         @             @             @             @             @             @             @             @
26,3630         @             @             @             @             @             @             @             @

26,3640         @             @             @             @             @             @             @             @
26,3650         @             @             @             @             @             @             @             @
26,3660         @             @             @             @             @             @             @             @
26,3670         @             @             @             @             @             @             @             @

26,3700         @             @             @             @             @             @             @             @
26,3710         @             @             @             @             @             @             @             @
26,3720         @             @             @             @             @             @             @             @
26,3730         @             @             @             @             @             @             @             @

26,3740         @             @             @             @             @             @             @             @
26,3750         @             @             @             @             @             @             @             @
26,3760         @             @             @             @             @             @             @             @
26,3770         @             @             @             @             @             @             @             @

THE ASSEMBLY WAS GOOD:  MANUFACTURABLE BINARY RECORDS ON DISC & NANSTONE.
```

```
473423A YJL SYSTEM MAINTENANCE FUNCTION: DIRECTORY LISTING OF NANSTONE #176                NOV 10, 1966
```

```
473423A YUL SYSTEM MAINTENANCE FUNCTION: DIRECTORY LISTING OF NANSTONE #176          NOV 10, 1966          PAGE   1

COMPUTER: AGC4
==============

          SOFTWARE
          --------

          ASSEMBLY PASS 1       ASSEMBLY PASS 2       ASSEMBLY PASS 3       MANUFACTURING        SIMULATION

             AVAILABLE             AVAILABLE             AVAILABLE             AVAILABLE         AVAILABLE

          PROGRAMS
          --------

           (NONE)

          SUBROUTINES
          -----------

           (NONE)
```

```
473423A YUL SYSTEM MAINTENANCE FUNCTION: DIRECTORY LISTING OF NANSTONE #176            NOV 10, 1966          PAGE  2

COMPUTER: AGC
*************

          SOFTWARE
          --------

          ASSEMBLY PASS 1          ASSEMBLY PASS 2          ASSEMBLY PASS 3          MANUFACTURING          SIMULATION

             AVAILABLE                AVAILABLE                AVAILABLE                AVAILABLE           NOT AVAILABLE


          PROGRAMS
          --------

            NAME  REVISION     AUTHOR      LAST ASSEMBLED  M,F,ABLE    SUBROUTINES (OBSOLETING SUBROUTINES PREFIXED BY "/")

          SUNDANCE     3   208GROUP          NOV 10, 1966     NO    MASTER         UTILITY        IMUCOMPL       PINDANCE
                                                                    SELFCHEK       COASTFLT       LEMDAP         PRELUNCH
                                                                    SYSTESTL       GEOMETRY       STARTAB

          SUNDISK      6   207GROUP          NOV 10, 1966     NO    MASTER         UTILITY        IMUCOMPC       PINDISK
                                                                    SELFCHEK       COASTFLT       DAPCSM         PRELUNCH
                                                                    SYSTESTC       GEOMETRY       STARTAB


          SUBROUTINES
          -----------

            NAME  REVISION     AUTHOR      LAST ASSEMBLED   CONTROL    SUBROUTINES (OBSOLETING SUBROUTINES PREFIXED BY "/")

          MASTER       1   REICHERT          NOV  7, 1966     NO             (NONE)

          UTILITY      3   REICHERT          NOV 10, 1966     NO             (NONE)

UNUSED    RUPTINSC (NEW)   REICHERT          NOV  3, 1966     NO             (NONE)

          IMUCOMPC     1   REICHERT          NOV 10, 1966     NO             (NONE)

          IMUCOMPL     1   REICHERT          NOV 10, 1966     NO             (NONE)

          PINDISK      3   REICHERT          NOV  7, 1966     NO             (NONE)

          PINDANCE     2   REICHERT          NOV 10, 1966     NO             (NONE)

          SELFCHEK     1   REICHERT          NOV 10, 1966     NO             (NONE)

          COASTFLT     3   REICHERT          NOV 10, 1966     NO             (NONE)

          DAPCSM       2   REICHERT          NOV 10, 1966     NO             (NONE)

          LEMDAP       3   LEM GROUP         NOV 10, 1966     NO             (NONE)
```

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PRELUNCH    1    REICHERT          NOV 10, 1966    NO             (NONE)
SYSTESTC    4    REICHERT          NOV 10, 1966    NO             (NONE)
SYSTESTL    2    REICHERT          NOV 10, 1966    NO             (NONE)
GEOMETRY    2    REICHERT          NOV 10, 1966    NO             (NONE)
STARTAB   (NEW)  REICHERT          NOV  3, 1966    NO             (NONE)
```

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COMPUTER: BLK2
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        SOFTWARE
        --------

        ASSEMBLY PASS 1         ASSEMBLY PASS 2          ASSEMBLY PASS 3          MANUFACTURING             SIMULATION

           AVAILABLE               AVAILABLE                AVAILABLE                AVAILABLE             NOT AVAILABLE

        PROGRAMS
        --------

          NAME  REVISION     AUTHOR     LAST ASSEMBLED   M'F'ABLE    SUBROUTINES (OBSOLETING SUBROUTINES PREFIXED BY "/")

        AURORA      12  DAP GROUP         NOV 10, 1966     YES            (NONE)

        SUNBURST    37  LEM GROUP         NOV 10, 1966      NO            (NONE)

        SHEPATIN     6  EYLES             NOV  2, 1966     YES            (NONE)

        MAMOUTH3     3  FILENE+GREEN      OCT 31, 1966     YES            (NONE)

        LOCAVOID     9  D. KEENE          OCT 28, 1966     YES            (NONE)

        MAMOUTH2    17  FILENE+GREEN      OCT 27, 1966     YES            (NONE)

        NEWPRET  (NEW)  STANDARD PACKAGE  OCT 22, 1966     YES            (NONE)

        SOCDANCE     1  SDC LEM           OCT  3, 1966      NO            (NONE)

        RADAR    (NEW)  GILBERT           SEP 20, 1966     YES            (NONE)

        LEADIN2  (NEW)  STANDARD PACKAGE  SEP 16, 1966     YES            (NONE)

        COMPASSS    15  SCHMIDT           AUG 24, 1966     YES            (NONE)

        SUBROUTINES
        -----------

         (NONE)
```

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COMPUTER: SACO
==============


          SOFTWARE
          --------

          ASSEMBLY PASS 1              ASSEMBLY PASS 2              ASSEMBLY PASS 3               MANUFACTURING                SIMULATION

              AVAILABLE                    AVAILABLE                    AVAILABLE                    AVAILABLE                    AVAILABLE

          PROGRAMS
          --------

           (NONE)

          SUBROUTINES
          -----------

           (NONE)
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AUTHOR: 207GROUP            NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: 208GROUP            NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: DAP GROUP           NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: D. KEENE            NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: EYLES               NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: FILENE+GREEN        NUMBER OF PROGRAMS AND SUBROUTINES:   2

AUTHOR: GILBERT             NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: LEM GROUP           NUMBER OF PROGRAMS AND SUBROUTINES:   2

AUTHOR: REICHERT            NUMBER OF PROGRAMS AND SUBROUTINES:  15

AUTHOR: SCHMIDT             NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: SDC LEM             NUMBER OF PROGRAMS AND SUBROUTINES:   1

AUTHOR: STANDARD PACKAGE    NUMBER OF PROGRAMS AND SUBROUTINES:   2
```

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*       ENDJ03                                                    PRINTED 00112   TIME:     11:51.4
```

```
FIXED START CALL                    FS BITS 1        PCR: 00005162    20650414

          BISEQ   BITS    00100100                  DEMAND  BITS    00110101

  0 0000          6'0074  5'0400  6'1231  6'1633  6'0220  6'0221  6'1164  5'0102
  0 0010         -0'0002 -0'0000  5'0374  6'3435  B'1515  B'1515  B'1515  5'0200
  0 0020          6'1237  B'1515  B'1515  B'1515  B'1515  B'1515  B'1515  B'1515
  0 0030          B'1515  B'1515  B'1515  B'1515 -1 3777 -2'0420 -D'3107 -6'2061

  1 0000          6'1405  6'1415  6'1501  6'1501  7'1717  7'1725  6'1164  5'0102
  1 0010          4'1060  7'2400  6'1441  5'0037 -0 0000  6'1414  2'0011  5'0200
  1 0020         -0 0000  2'1737  2'0164  2'0165  7 0007  6'1405  2'0734  6'2724
  1 0030          6'1405  2 1625  1 0000  1 1266 -7'3777 -1 3777  2'0220 -1 3777

  2 0000         -0'0000 -0'0000  7'2506  7'2532  7'2721  7'2566  6'1164  5'0102
  2 0010          1'0000  7'2403  7'2415  6'3270  7'2417  6'0267  6'0000  5'0200
  2 0020          6'0074  B'1515  7'3047  7'3240  7'2505  6'1365  7'3262  B'1515
  2 0030          6'1501  6'3172  B'1515  B'1515  7'1344 -1 3777  7'1451 -1 3777

  3 0000          7'1552  7'1553  7'0305  7'0325  7'0304  7'0321  7'0776  7'0716
  3 0010          5'2700  7'1071  7'0100  7'0101  7'1240  7'1554  7'0127  5'0200
  3 0020          7'0672  B'1515  7'0207  7'0000  7'0101  7'0101  5'2700  5'3000
  3 0030         -0'0004  7'0262  5'2745  B'1515  6'3600  6'2370  7'2401  7'2162

  4 0000          6'1410  6'1415  6'1501  6'1501  7'1717  7'1725  6'1164  5'0102
  4 0010          2'1643  7'2337  1 0004  4 0146  7 1131  7 0006  7 1130  5'0200
  4 0020          7 1303  7 0031  7 0165  1 2766 -6 3775 -6 3755  4 0174  4 0166
  4 0030         -0'0000 -0 0000  G 0013 -0 0000  7'2651 -1 3777  7'1111 -1 3777

  5 0000          4'0467  5 0004  4'3061  4'2616  4'2537  4'2614  6'1164  4'3674
  5 0010          4'0443  4'0657  3'2240  4'0660  4'0725  0'0035  4'3545  5'0200
```

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5 0020        4'1343  1 2550  7'3631  6'1404  2 0627  4'1450 -0'0001  4'2272
5 0030       -G 3777  5 0425 -0'0020 -0'0000  4'2371 -1 3777  4'2605 -1 3777

6 0000        6'1412  6'1414  6'1501  6'1501  7'1717  7'1725  6'1164  5'0102
6 0010        4 2720  7'2320  F 1112  6 2144  E 0000  4 0000  D 3760  5'0200
6 0020        7 0475  7 0026  E 0041 -D 0017  B 2011 -7 0503  7 3604  7 3603
6 0030        0 0020  B'1515  6 3722  6 3760  0'0012  0'0113  0 0000 -1 3777

7 0000       -0'0000  6'3076  6'3066  6'3252  6'3072  6'3250  6'0540  5'0102
7 0010        7'0013  6'3400  6'0362  5'0200  6'0366  6'0516  7'0016  5'0200
7 0020        6'0321  B'1515  B'1515  B'1515  B'1515  B'1515  B'1515  B'1515
7 0030        B'1515  B'1515  B'1515  B'1515 -5'3444 -1 3777  5'3304 -1 3777

5'0200        WD 2135 1000 0120 0002  WA 2515 0117 0604 0002  WA 2515 0017 0604 0002  TS 2204 0602 0001 0772
5'0204          EOR.                  TS 6004 7777 7777 1216     0000 0000 0000 0000     7407 0212 0000 1264
5'0210        WA 2515 0217 0604 0002     4162 2543 2523 6315     0000 0000 0000 0000  WA 2515 0004 0773 0004
5'0214        WA 2515 0004 0773 0004  TS 2604 0004 0031 1175  WA 6515 0417 0747 0003     7417 0012 7777 7777
5'0220        TS 2604 0000 0001 0772  TX 6120 0756 7777 0003  TX 6120 0757 7777 0003  TS 6004 7777 7777 1220
5'0224        TS 2004 7777 7777 1230     0000 0000 4013 7777     0000 0000 4013 7765     7427 0356 7777 7777
5'0230        WA 6515 0017 0747 0003 SM, 3145 2144 2515 1515     1515 1515 1515 1515     7777 7777 7777 7777
5'0234       SM, 4645 2144 2515 1515     1515 1515 1515 1515     7777 7777 7777 7777     7437 1446 0000 6400
5'0240        TS 2004 3002 0002 1225     0000 0000 4012 4300     0000 0000 4012 4370     0000 0000 4012 4200
5'0244       FBAE0101 3301 0033 0606     2163 2061 0000 0000     0000 0000 0010 4000     0407 0304 0203 1515
5'0250        TS 6204 0352 0000 1212  TX 2120 0761 7777 0002  TX 6120 0760 7777 0003  TS 2404 0002 0001 1227
5'0254       MPC 2200 7777 0000 7777     0000 0000 0013 0026  TS 2004 7777 7777 1171  LA 2334 0774 0001 0041
5'0260       EBA 3513 0001 7461 0002     0000 0000 4000 0000     0000 0000 0017 4000     0000 0000 0013 7777
5'0264           0000 0000 4000 0200     0000 0000 0000 0001 FBAE0001 0333 0013 6403     0000 0000 0000 0000
5'0270        TS 2004 0025 0003 1227     0000 0000 0000 0000     6247 2123 2515 1515     5413 6260 6133 1365
5'0274       FBA 5201 1250 0713 5660     0000 0265 6473 6505  TX 6120 0277 7777 0003     0000 0000 0013 2040
5'0300           0000 0000 0000 7000     1107 0364 4520 0370 SWS 2406 0000 0021 7434 SWS 2306 0000 0022 7430
```

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5'0304         0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000

          PRECEDING LINE IS REPEATED, UNTIL:

5'0324         0000 0000 0000 0000  TS 2004 3003 0002 1225  RF 6072 7777 7777 7777  TX 6520 0005 7777 0003
5'0330      SS 0006 0164 0116 0521  TS 2204 0653 0017 0022 HA, 2165 2131 4321 2243  WA 2515 0417 0604 0002
5'0334         0000 0000 0012 5536  WD 6135 0767 0120 0003  TX 2120 0753 7777 0002      7537 0205 7777 0215
5'0340      TS 2004 0050 0001 1227      0000 0000 0000 0000  TS 2604 0004 0010 1514  TS 6204 0754 0003 7777
5'0344      TX 2120 0755 7777 0002  TS 6604 0002 0000 0201 MPC 2600 0000 1401 7734      7547 0006 7777 0161
5'0350     EBA 7113 0602 0602 0007  WA 2515 0217 0604 0002      0000 0000 0000 0047      0400 2400 7700 0000
5'0354     DA, 6141 0000 0571 4000 LA, 1074 0000 0000 0000      0000 0000 0000 0000  TS 2004 3002 0007 1225
5'0360         0021 2424 0000 0004      0021 2424 0000 0004  TS 2004 7777 7777 1155  TS 2004 3003 0003 1225
5'0364         0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000
5'0370      DA 6201 0250 0050 0420 FDSU3031 6263 4651 7015      2163 1461 1410 0011  WF 1156 6470 0000 0000
5'0374      DA 6601 0070 7070 0000 PR* 6646 5142 2551 1515      0000 0000 2147 0000      0000 0000 0000 0000
5'0400      DA 6401 0050 0050 0000      2143 4645 6246 1515 TS, 2144 3562 2403 0000  RW 1342 6777 7777 7777
5'0404    FBAE0001 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000
5'0410      DA 6601 0070 7070 0000 PR* 6646 5142 2551 1515      0000 0000 0164 0000      0000 0000 0000 0000
5'0414    FBAE4501 0063 0063 0000      4421 5162 5146 6315      2163 2024 0471 0001  RB 1652 6464 3100 0000
5'0420         4502 0060 0063 0000      4521 4562 6346 4525      2163 2043 0005 0567  RF 2172 6450 0000 0000
5'0424     SPS 6602 0070 7070 0000 PR* 6646 5142 2551 1515      0000 0000 2563 0000      0000 0000 0000 0000
5'0430     SPS 6202 0273 0073 0022      6263 4722 2662 2721      2163 1462 1021 0002      0000 0000 0000 0000
5'0434     SPS 6202 0273 0073 0021      6263 4722 2662 2721      2163 1462 2111 0001      0000 0000 0000 0000
5'0440         7777 0077 0651 0001      0000 0000 0000 0000      0000 0000 0000 0000  TS 2604 0004 0000 7536
5'0444         0000 0000 0000 0000  TS 2104 7777 7777 0040  TX 6120 0751 7777 0003      0000 0000 0000 0000
5'0450      TS 2004 0052 0002 1227 PR* 4446 5131 2151 6370      0000 0103 0000 0001      0000 0000 0000 0000
5'0454         0000 0077 4012 3544      0000 0000 0000 0000  RW 4242 4154 5446 0040 HA, 2165 2131 4321 2243
5'0460         1562 4721 2325 1515      7300 0000 0000 0000      0000 0000 4012 5014  TX 6120 0765 7777 0003
5'0464      TX 6120 0766 7777 0003 HA, 2165 2131 4321 2243 EBA 3013 7777 7777 7777 HA, 2165 2131 4321 2243
5'0470     HA, 2165 2131 4321 2243 HA, 2165 2131 4321 2243 HA, 2165 2131 4321 2243 HA, 2165 2131 4321 2243
5'0474     HA, 2165 2131 4321 2243 HA, 2165 2131 4321 2243      0000 0000 0000 0000      7677 0000 0170 0001
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5'0500       TS 2004 1003 0001 1225 HA, 2165 2131 4321 2243     0000 0000 0010 0035  TS 6004 7777 7777 1222
5'0504       TS 2104 7777 7777 0041 HA, 2165 2131 4321 2243     0000 0000 0000 0000     0000 0000 0000 0000
5'0510          0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000
5'0514          0000 0000 0000 0000  TS 2004 3002 0004 1225 MPC 2600 0000 1401 7734     0000 0000 0000 0000
5'0520       TS 2004 3001 0004 1225     4000 2070 0077 0001     0777 3000 7700 4007 NN, 1550 0000 0163 0000
5'0524       TS 2004 3002 0010 1225  TS 6004 7777 7777 1210     0000 0000 0013 4000     7727 1317 0210 7777
5'0530       WA 2515 0117 0605 0002  WD 6135 0763 0120 0003 DS, 1461 0000 0000 7560     0000 0000 0000 0000
5'0534          0000 5162 2065 0414  TX 2120 0762 7777 0002     0000 0000 0000 0000     7737 3761 7777 7777
5'0540       TS 2004 0041 0001 1227  TX 6120 0752 7777 0003     0000 0000 0000 0000     0000 0000 0000 0000
5'0544          0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000

           PRECEDING LINE IS REPEATED, UNTIL:

5'0554          0000 0000 0000 0000  TX 2120 0770 7777 0002  SS 0006 5265 1777 0000     7757 4400 0001 1207
5'0560       WA 2515 1117 0604 0002     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000
5'0564          0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000     7767 4400 4001 0603
5'0570       WA 2515 1117 0604 0002  WD 6535 0003 0120 0003  TX 2020 7773 7777 7772  TX 2020 7773 7777 7772
5'0574          0000 0000 0000 0000     0000 0000 4013 1164     0000 0000 4012 4102     0000 0000 0000 0000
5'0600      MPC 2600 0001 1401 7734     2143 4315 0712 6215     0000 0000 0000 0000     0000 0000 0000 0410
5'0604          0000 0000 0000 0407     0000 0000 0000 0406  WA 2515 0017 0773 0017  WA 2515 0017 0773 0017
5'0610       TS 2004 0652 0610 7777 MPC 2300 0000 2000 0142     0000 0000 0000 0000 EBA 3413 0000 0602 0700
5'0614       WA 2315 0613 0142 0000     0000 0000 0010 4000  SS 0106 0612 0103 0140 EBA 3513 0004 0602 0140
5'0620      EBA 3513 0005 0602 0140 EBA 3513 0007 0602 0140  WD 2535 0000 0173 0005  LA 2434 0040 0602 0626
5'0624       NA 2414 0400 0651 0623  TS 2204 0650 0000 0623  SS 0406 0000 0647 0613  NA 2014 0740 0602 0633
5'0630      PR* 0046 0631 0200 0632  DS 2321 5124 1524 4447 MPC 2200 0001 1400 7777  WD 2535 0017 0653 0004
5'0634       TX 2120 0575 7777 0007  TX 2120 0653 7777 0017  EX 0516 0004 0647 0000  WA 2515 0000 0646 0000
5'0640       TS 2004 0602 0612 7777  TX 2020 1003 7777 0610 SSL 2426 0004 0542 0643  TX 2520 0040 7777 0002
5'0644      SWS 2506 0040 2066 0002 SWS 2506 0040 4066 0002     0000 0000 0012 4751     0000 0000 0000 0037
5'0650          0000 0000 0012 4700     0000 0000 0012 4740  WD 2535 0002 0120 0002     0000 0000 0012 4200
5'0654          0000 0000 0010 0000     0000 0000 0010 0000     0000 0000 4013 1633     0000 0000 4012 4256
5'0660          0000 0000 4000 4766     0000 0000 4000 5330     0000 0000 4001 6235     0000 0000 0000 0000
```

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5'0664       0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000

         PRECEDING LINE IS REPEATED, UNTIL:

5'0700       0000 0000 0000 0000      0000 0000 4013 3161      0000 0000 4013 3175      0000 0000 4012 4102

         PRECEDING LINE IS REPEATED, UNTIL:

5'0714       0000 0000 0000 0000      0000 0000 4013 3162      0000 0000 4013 3163      0000 0000 4012 4102
5'0720       0000 0000 0000 0000      0000 0000 4013 2005      0000 0000 4013 3166      0000 0000 4012 4102
5'0724       0000 0000 0000 0000      0000 0000 4013 3162      0000 0000 4013 3163      0000 0000 4012 4102
5'0730       0000 0000 0000 0000      0000 0000 4013 2005      0000 0000 4013 3166      0000 0000 4012 4102
5'0734       0000 0000 0000 0000      0000 0000 4013 3161      0000 0000 4013 3175      0000 0000 4012 4102
5'0740    WA 6515 0017 0773 0017   WA 6515 0017 0773 0017  EBA 7513 0002 0602 0005   TX 2120 0744 7777 0002
5'0744       0000 0000 0012 4610      0000 0000 0000 0542      0000 0000 0000 0541      0000 0000 0000 0540
5'0750       0000 0000 0000 0000  WD, 5475 7662 4353 1635   RF 5472 1661 3533 1456      0000 0265 1213 1616
5'0754   FBD 5505 1262 5613 1630      5516 2660 5233 5713  HA, 5465 3652 5653 1524  HA, 5465 1263 2413 0203
5'0760       0000 0263 2633 2706      0000 0000 0013 2675      0000 0260 5313 0264      0000 0000 0012 5225
5'0764       0000 0000 0000 0000      0000 0263 5033 1515      0000 0000 0013 0202      0000 0000 0012 5227
5'0770       0000 0000 0013 1540      0000 0000 0000 0000   WA 2515 0317 0605 0002      0000 0000 0000 0040
5'0774       0000 0000 0010 0000      0000 0000 0000 0777      0000 0000 0000 3777      0000 0000 0007 4000
5'1000       0000 0000 0013 2720   LA 2034 0612 0602 1003   TS 2004 7777 7777 1001   TS 2004 0652 0610 7777
5'1004   MPC 2200 0000 2000 0612   WA 2115 0613 0615 0000   MT 0520 0145 0400 0140   TS 2604 0345 0245 7777
5'1010    TS 2204 0602 0045 0622      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000
5'1014       5415 1515 1515 1515  CP, 7064 4315 4521 4562  PR* 6346 4525 1515 1515      1515 1515 1515 1515
5'1020       1515 1515 1515 1515      1515 1515 1515 1515      1515 1515 1515 1515      1515 1515 1515 1515
5'1024       1515 1515 1515 1515      1515 1515 1515 1515  SM, 3145 2144 2515 1515      1515 1515 1515 1515
5'1030       7777 7777 7777 7777  SM, 4645 2144 2515 1515      1515 1515 1515 1515      7777 7777 7777 7777
5'1034       0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000
5'1040    RF 0672 5000 7777 4176   RF 0072 7777 7777 7777      0000 0000 0013 0656      0000 0000 4002 1476
5'1044    RF 0072 5022 0412 5143      0000 0000 4000 7674      0000 0000 4003 5130      0000 0000 4002 7000
5'1050       0000 0000 4002 6000      0000 0000 4002 5000      0000 0000 4002 5000      0000 0000 4003 4000
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5'1054      0000 0000 4000 4000      0000 0000 4013 1164      0000 0000 0000 0000  RF 1272 5000 7777 7777
5'1060  TX  2520 0004 7777 0002  TS  6604 0005 0003 7777  RF  0172 7777 7777 7777  RF 0072 7777 7777 7777
5'1064      0000 0000 0013 0652      0000 0000 4000 6746  RF  0072 7022 0512 5100     0000 0000 4000 7674
5'1070      0000 0000 4003 5130      0000 0000 4002 1645      0000 0000 4002 6000     0000 0000 4002 4000
5'1074      0000 0000 4003 4121      0000 0000 4003 4000      0000 0000 4000 4000     0000 0000 4013 1164
5'1100      0000 0000 4002 4000  RF  2172 7777 7777 7777  TX  2520 0004 7777 0002  TS 6604 0005 0003 7777
5'1104  WF  0156 7777 7777 7777  WF  0056 7777 7777 7777      0000 0000 0013 0666     0000 0000 4013 7262
5'1110  WF  0056 5023 0412 5122      0000 0000 4012 4102      0000 0000 4003 5130     0000 0000 4000 5326
5'1114      0000 0000 4001 1615      0000 0000 4003 0726      0000 0000 4012 4374     0000 0000 4012 4304
5'1120      0000 0000 4003 4000      0000 0000 4013 1164      0000 0000 4003 0726  WF 1256 7777 7777 7777
5'1124  TX  2520 0004 7777 0002  WF  0156 7777 7777 7777  WF  0056 7777 7777 7777     0000 0000 0013 0662
5'1130      0000 0000 4013 7262  WF  0056 5022 0512 5143      0000 0000 4012 4102     0000 0000 4003 5130
5'1134      0000 0000 4002 1645      0000 0000 4002 6000      0000 0000 4002 4000     0000 0000 4012 4420
5'1140      0000 0000 4012 4305      0000 0000 4003 4000      0000 0000 4013 1164     0000 0000 4002 4000
5'1144  WF  2156 7777 7777 7777  TX  2520 0004 7777 0002  TS  6604 0002 0145 7777  TS 6604 0005 0003 1151
5'1150  TS  6604 0040 0145 7777  LA  6234 1607 0005 1153  TX  2420 0005 7777 1606  WD 2235 1607 0043 1606
5'1154      0000 0000 0000 0070  EX  0016 7721 0135 1170  NA  2014 1170 0135 1164  EX 0516 0045 0121 0001
5'1160  NA  2414 0045 0120 1165  EBA 3513 0005 1571 0000  TS  6404 0102 7777 7535     0000 0012 0002 0000
5'1164  TS  2004 3001 0006 1225  NA  2414 0045 1167 1164  TS  2004 7777 7777 1161     0000 0000 0000 0015
5'1170      0000 0000 0000 0000  EBA 3413 0003 0602 0656  EBA 3413 0005 0602 0657  TS 6004 7777 7777 1202
5'1174  SWE 2116 1201 4066 0002  EBA 3413 0003 0602 0656  EBA 3413 0005 0602 0657  TS 6204 0206 0032 1202
5'1200  SWE 2116 1201 2066 0002      5403 0660 1313 0242  EBA 7413 0000 0602 0654  EBA 7413 0001 0602 0655
5'1204  EBA 7413 0006 0602 0660  EBA 7413 0007 0602 0661  EBA 7413 0010 0602 0662  TX 6120 1201 7777 0003
5'1210  EBA 7513 0004 0602 0005  TS  2004 0005 0001 1227  TX  6020 1215 7777 0352  EBA 7513 0004 0602 0005
5'1214  TS  2004 3001 0010 1225      0000 0000 0000 0047  EBA 7513 0004 0602 0005  TS 2004 3005 0002 1225
5'1220  EBA 7513 0004 0602 0005  TS  2004 3003 0007 1225  EBA 7513 0004 0602 0005  TS 2004 3001 0002 1225
5'1224  EBA 7513 0002 0602 0004  WA  2515 0317 0604 0002  EBA 7513 0005 0602 0004  WA 2515 0517 0604 0002
5'1230  LA  2334 0140 0145 0045  TS  2004 7777 7777 1230  EBA 3513 0005 0602 0000  NA 2414 0140 0602 1235
5'1234  LA  2334 0140 0140 0040  EBS 3533 0000 0120 0000  SWS 2506 0040 2040 0040  SWE 2516 0040 0023 0001
5'1240  SWE 2516 0040 0024 0040  LA  2434 0001 0602 1233  LA  2234 0105 0001 1233  SS 0506 0001 0776 0050
```

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5'1244     EBA 3513 0050 0602 0001 SSL 6426 0041 1542 1251 SSL 6426 0041 1542 1251 SSL 6426 0041 1542 1251
5'1250      TS 2004 7777 7777 1233 SWS 2506 0041 2040 0041 SSL 6426 0041 1342 1254 SWS 2506 0041 2040 0041
5'1254     SWS 2506 0041 2040 0041  SS 4506 0203 0777 0041  SS 4106 7425 1261 0041  SS 4106 7425 1261 0041
5'1260     SWS 2506 0041 2040 0041     0000 0000 0004 0000 PR* 0046 7462 0204 7777 EBA 3113 7464 0602 0017
5'1264      TS 2604 0004 0002 7777     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000
5'1270         0000 0000 0000 0000     0000 0000 0000 0000  TS 2604 0105 0000 1273 EBS 3533 0045 0120 0005
5'1274     SWE 2516 0045 3345 0003  WA 2515 0003 1536 0003 SWS 2406 0045 0334 1277 SWE 2516 0043 2074 0004
5'1300      LA 2634 0142 0004 1331     0000 0000 0003 0000 EBA 3513 0010 0602 0003  WA 2515 0004 1537 0010
5'1304      LA 2034 4001 0602 1310 EBA 3513 0003 0602 0010  TS 6004 7777 7777 7646  TS 2604 0000 0005 1272
5'1310     MPC 2000 0000 2000 4001 SWS 2406 0045 3005 4001 NA, 0554 4001 4002 1326  WA 2015 1540 1541 1540
5'1314      SS 0006 1540 0130 4002 EBA 3413 0001 0602 4075 EBA 3413 0006 0602 4076  TX 2420 0040 7777 4071
5'1320      TS 2204 0602 0140 7777  TN 1420 0040 0300 4072  TX 2520 0010 7777 0004 EBA 3513 0003 0602 0050
5'1324     SWS 2506 0004 0515 0004  TS 2604 0004 0007 4003  TX 2020 0602 7777 4001 EBA 3513 0003 0602 0010
5'1330      TS 2604 0000 0005 1272 EBA 3513 0010 0602 0003 SWE 2116 1622 0074 0004  WA 2515 0004 1537 0010
5'1334      LA 2034 4001 0602 1336  TS 2004 7777 7777 1305 MPC 2000 7777 2000 4001  TX 2420 0000 7777 1561
5'1340      NA 2014 1564 0602 1411 SWE 2516 0045 3345 0000  WA 2515 0000 1536 0000 SWS 2406 0045 0334 1344
5'1344     SWE 2516 0040 2074 0000  LA 2234 1301 0000 1351  TS 2004 0602 4001 7777 EBA 3513 0003 0602 0010
5'1350      TS 2204 1561 0005 1272 SWE 2416 0000 2241 1556 TX, 1060 0110 7777 1556 EBA 3413 0001 0602 4075
5'1354     EBA 3413 0006 0602 4076  TX 2120 0575 7777 0006 EBA 3413 0011 0602 1574 EBA 3413 0012 0602 1575
5'1360     SWE 2516 0000 0615 0004  LA 2434 0004 0602 1363  WA 2515 0004 1543 0005  TX 2020 0102 7777 1576
5'1364      TS 2604 0010 0002 1323     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000
5'1370         0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000

           PRECEDING LINE IS REPEATED, UNTIL:

5'1410         0000 0000 0000 0000 SWE 2116 1564 2066 0000 LA, 2374 0123 1564 1421  MT 0120 0602 0300 0140
5'1414      WA 2715 0000 0142 0000     0000 0000 0000 0074 SWE 2516 0040 0066 0000 SWE 2116 1564 0066 0004
5'1420      NA 2614 0000 0004 1413  MT 0120 0602 0300 0140  TS 2004 0602 1564 1341     0000 0000 0000 0000
5'1424      WA 2515 0010 1562 0010  LA 2234 1550 0010 1436  LA 2034 1554 4002 1424  NA 2014 4001 0602 1424
5'1430      EX 0016 4002 1542 1435 NA, 0454 1435 0602 1424 SWS 2406 0010 0066 1554  LA 2034 4002 0602 1436
5'1434     TS, 3044 4002 1554 1424     1403 0004 1403 0060  LA 2034 0140 1554 1441  TX 2120 1554 7777 0010
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5'1440      LA 2034 4001 0602 1443  WA 2115 1537 1562 0010  TS 2004 0140 1554 1427 MPC 2200 7777 2000 4001
5'1444      LA 2034 4002 0602 1454 SWE 2116 4077 4445 0001  TS 6204 4002 0000 1455  TS 2004 0602 4002 7777
5'1450     NA, 2354 4077 0123 1452  TS 2204 1554 0010 1454  TS 2204 4077 0010 7777  TS 2004 0602 4001 1447
5'1454      TX 2120 1553 7777 0002 SWE 6516 0000 0345 0005  WA 6515 0005 1536 0005 SWS 6406 0000 3334 1460
5'1460     SWS 6406 0045 2040 1435 SWS 6406 0001 5274 1435 WD, 7475 1555 1460 1463 SWS 6006 1435 4040 1435
5'1464      TS 2204 1435 0045 7777 SWE 2116 1564 2066 0010 LA, 1674 1556 0602 1472 SWE 2116 1556 4415 0000
5'1470      WA 2515 0000 1543 0000 SWS 2406 0040 0005 4002 SWE 2116 1537 0066 0001  WD 2735 0010 0001 0001
5'1474     SWE 2516 0001 0645 0001 SWE 2116 4002 0005 0000  TS 6004 7777 7777 1455  TS 2004 0602 1564 7777
5'1500      TX 2020 0602 7777 4001  TX 2120 1561 7777 0000  TX 2120 1565 7777 0010 EBA 3113 1574 0602 0011
5'1504     EBA 3113 1575 0602 0012 EBA 3113 4075 0602 0001 EBA 3113 4076 0602 0006  TS 2004 0602 4001 7777
5'1510      TS 2004 0602 1576 7777 EBA 3513 0050 0602 0010  TS 6004 7777 7777 7543  TS 2004 7777 7777 1566
5'1514      SS 0106 0602 0115 0010  TS 2204 0576 0007 1517 SWS 2106 4077 2066 0010 NA, 1254 4077 0112 1516
5'1520     EBA 3113 4071 0602 0000 EBA 3113 4075 0602 0001 EBA 3113 4076 0602 0006 SWE 2116 4074 3045 0004
5'1524     EBA 3113 4074 0602 0007  TS 6004 0602 4001 7543  SM 2205 0262 0004 0262  NA 2414 0004 0602 1533
5'1530     EBA 3113 4073 0602 0003 EBA 3513 0050 0602 0010  TS 2104 7777 7777 0043 EBA 3113 7464 0602 0017
5'1534     PR* 0046 0262 0204 1530     0000 0000 0000 0000     0000 0000 0012 5622  RF 5472 5257 4012 5600
5'1540      SS 0006 7553 0000 0000     0000 0001 0000 0000     0000 0000 2001 0000     0000 0000 0012 5364
5'1544         0000 0000 0013 1404     5724 2663 2033 2451     4431 4562 2163 0000     0000 0000 0420 0000
5'1550         0000 0000 0013 0000     0000 0000 0010 0000  TS 2404 0004 1553 1441     0000 0000 0012 5744
5'1554      SS 0006 7507 7772 6600     0000 0000 6000 0000     0300 7657 4017 7777     0000 0112 0000 0000
5'1560         0000 0000 0000 0000     0000 0000 0012 4720     0000 0000 0000 0100  TS 2204 0576 0007 1465
5'1564         0000 0000 0000 0000     0000 0000 0012 5700  TS 2004 7777 7777 1307     0000 0000 0000 0000
5'1570         0000 0000 0000 0001     0000 0000 0000 0002     0000 0000 0000 0003     5727 7261 6713 1151
5'1574         0000 0000 4012 5536     0000 0000 0013 0322     0000 0000 0000 0000     5476 0261 2332 4022
5'1600     LA, 5474 4675 6413 2005  CC 5210 0300 4012 7777 TX, 5460 2200 4013 1456     5716 6660 5513 6300
5'1604         0000 0000 0000 0000 PR* 5246 3260 6433 0561     0000 0000 0010 0000     0000 0000 0010 0000
5'1610         0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000

           PRECEDING LINE IS REPEATED, UNTIL:

5'1620         0000 0000 0000 0000     0000 0000 0000 0000     1403 0060 0010 0160     1403 0060 1403 0060
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5'1624        1403 0060 1403 0060     1400 0460 1403 0060     1403 0060 0077 0060     0057 0060 1400 1460
5'1630        1403 0060 1403 0060     1403 0060 1403 0060     1403 0060 1400 0560     1403 0004 1403 0060
5'1634        1403 0060 1403 0060     1403 0060 1403 0060     1403 0060 1403 0060     1403 0060 1403 0060
5'1640        1403 0060 1403 0060     1403 0060 0107 0060     1403 0060 0064 0760     1403 0060 1403 0060
5'1644        1403 0060 1403 0060     1403 0060 1403 0060     1403 0060 1403 0060     1403 0060 1403 0060
5'1650        1403 0060 1403 0060     1403 0060 1403 0060     0000 0000 0000 0000     0000 0000 0000 0000
5'1654        0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000

         PRECEDING LINE IS REPEATED, UNTIL:

5'1700        0000 0000 4012 7300     0000 0000 0000 0000     0000 0000 2000 0011 EBA 3413 0011 4067 4061
5'1704    EBA 3413 0012 4067 4062  TX 2120 7534 7777 0011  TX 2420 0010 7777 4427 SWE 2016 7553 0021 4065
5'1710    SWE 2416 0045 0015 4421  WA 2015 4421 4065 4065 SWE 2416 0045 1420 4422  TS 2404 0007 4063 4023
5'1714        7777 7777 7777 7777     0000 7777 0000 0000     0000 0377 7760 0000     0000 0000 0007 7777
5'1720        0000 0000 0000 7777     0077 7777 0000 0000     0000 0000 0017 7777  TS 6604 0010 0012 5060
5'1724     TS 2004 5014 5064 4414  TX 2120 5063 7777 0007 SWS 2406 0010 4016 5064  TS 2004 5064 4426 5032
5'1730    TS, 1744 4420 4426 7777  TS 2204 4426 0010 7777  TS 6004 5067 5066 5033  RF 3172 4000 5065 5034
5'1734     WD 6035 4422 4432 4422  WA 6015 5065 5071 5065  NA 6014 5066 5067 5047 SWS 6006 5064 4016 4420
5'1740    SWS 6006 5022 0022 4420  LA 6034 4422 5067 5047  TX 6120 7776 7777 0007  TS 2404 0010 5064 4414
5'1744     TX 2120 5063 7777 0007 SWS 2406 0010 0022 4420  TS 6204 5064 0010 5047  RF 3172 7777 7777 5052
5'1750    PR* 0046 5051 0200 7456 BA, 2451 2521 2425 5151  TS 2004 4420 4077 5053  NA 2014 4422 5067 5030
5'1754     TX 2520 0011 7777 0010 EBA 3113 5061 5067 0011 EBA 3113 5062 5067 0012  TS 2004 7777 7777 4025
5'1760     TX 2120 7775 7777 0007     0000 0000 4012 5536     0000 0000 0013 0322     0000 0000 0012 5736
5'1764        0000 0000 0012 7600     0000 2514 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000
5'1770        0000 0000 0000 0000     0000 0001 0000 0000     1203 4755 6216 6455     0110 3521 6065 0503
5'1774    EOI5240 0355 7351 3524      0000 0000 4012 7375     0000 0000 4013 0540 EOI5240 0356 7351 3524
5'2000    MPC 2600 0000 1401 7734     7777 7777 7777 7777     0000 0000 0000 0012 EBA 3413 0011 4005 4015
5'2004     TS 2204 4077 0011 4022     0000 0000 0000 0000     0000 0000 0000 0001     0000 0000 0007 7777
5'2010        1515 1515 1515 1515     0000 0000 0017 7777     7777 7777 0000 0000     7700 0000 0000 0000
5'2014        0077 7777 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000     0000 0000 0000 0000
5'2020        0000 0000 0000 0017     0000 0000 0000 0000 EBA 3413 0012 4005 4016 EBA 3413 0013 4005 4017
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5'2024     LA, 0774 4075 4020 4030  SS 0006 4012 4012 4015  TX 2020 7411 7777 4472  TS 2004 4010 4473 4042
5'2030     NA, 0754 4075 4006 4037  TX 2020 4071 0000 4073 EBS 3133 4071 4006 0012  SS 0006 5000 4007 4071
5'2034     EBA 3113 4071 4005 0012  TN 1020 5000 0200 4472 TS, 1244 5002 4015 4042 NA, 0754 4075 4465 4041
5'2040      TS 2004 4071 4073 4032  TS 2004 4000 4071 4034  TX 2120 7534 0000 0012  TX 2020 5045 0000 4021
5'2044     SWE 2116 4021 2011 0013  TS 2004 4005 4471 5400 MPC 2200 0000 2000 5403  SS 0006 4013 4013 5403
5'2050     SWE 2016 4021 4011 4072  HA 2025 4472 4473 4400  BM 0013 4400 4400 4400  EX 0016 4400 4463 4400
5'2054      WA 2015 4400 7553 4400 SWE 2016 4400 3014 4445 WA, 1455 4463 4445 4445 SWS 2006 7553 3014 4016
5'2060     WA, 1455 4463 4016 4016 WA, 1255 4016 4464 4016  TS 2204 4021 0012 4403 WA, 1255 4470 4445 4445
5'2064      TS 2204 4021 0012 4403 EBA 3113 4016 4005 0012 EBA 3113 4015 4005 0011 EBA 3113 4017 4005 0013
5'2070      TS 2004 7777 7777 7542      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000
5'2074          0000 0000 0000 0000      0000 0000 0000 0000 MPC 6300 0433 1730 4305 WA, 6055 2511 4631 0473
5'2100          0000 0000 0012 7776      7777 7777 7777 7777      0000 0000 0000 0172  TS 2204 5477 0016 7021
5'2104      TS 2204 7702 0015 5405 SWE 2116 7445 0404 0052 SWS 2106 7445 5016 6401 SWS 2106 7445 3011 6402
5'2110     SWS 2106 7445 0414 0040 SWS 2506 0010 4015 0040  WA 2015 5000 5471 5004  TX 2020 4436 7777 5021
5'2114      TS 6004 7445 5415 7452 PR* 4446 4521 4664 6315 SWS 2006 4465 2620 5467      7727 5467 1620 7777
5'2120     SWS 2006 5465 3023 5415      7727 5415 0610 7777      7727 5465 1620 7777 EBA 3113 4473 6031 0022
5'2124      TX 2420 0162 0000 5415      7727 5415 0210 7777  TX 2420 0162 0000 5457 NA, 3654 4475 4436 5433
5'2130     LA, 2274 7471 6031 5433 LA, 2174 7471 6031 5433      7727 5463 0210 5442  TX 2120 4475 7777 0001
5'2134      TX 2020 5462 7777 5437  TS 6404 0102 7777 7535      0000 0033 0001 0000      0014 0000 0000 0035
5'2140      NA 2014 5437 6031 5443      7727 5464 0210 7777  TS 2004 6031 4457 7456  NA 2014 5457 4411 5455
5'2144     EBA 3413 0010 6031 4472  TX 2420 0007 7777 5400      7547 5415 7777 4472 EBA 3413 0001 6031 4472
5'2150      TX 2120 5400 7777 0007 NA, 3654 4436 4475 7014  TS 2004 7777 7777 7456  TS 6404 0102 7777 7535
5'2154          0000 7777 0001 0000  TS 2004 7777 7777 7402 MPC 6400 0050 0050 0076      7777 7777 7777 7777
5'2160     SWS 2406 0010 5717 4461      7717 5415 4401 4450      1400 0000 0000 0001  DS 2221 5131 4564 6225
5'2164     PR* 4546 1523 4651 2515      1515 1515 1515 1544      6443 6331 4146 2215 BA, 2751 4664 4715 0515
5'2170     PR* 4346 2715 5215 1415      0000 0000 0005 0000      0000 0000 0000 0000      0000 0000 0000 0000
5'2174          0000 0000 0000 0000      0000 0000 0000 0000      2037 7152 0714 4017      0300 7657 6012 7400
5'2200          0000 0000 4012 0000      0000 0000 0000 0000  SS 0006 7515 0000 0033 EBA 3413 0011 4016 4072
5'2204      TS 2604 0010 0011 4417      0000 0000 0000 0040      0000 0000 0000 0003      0000 0000 0000 0007
5'2210          0000 0000 0000 0020      0000 0000 0000 0030      0000 0000 0000 0005      0000 0000 0000 0006
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5'2214      0000 0000 0000 0004     0000 0000 0000 0002     0000 0000 0000 0000 EBA 3113 4473 4416 0010
5'2220   TX 2420 0050 7777 4432 SWS 2006 4475 5305 4432 SSL 2426 0050 0006 4423 TS, 0744 4413 4432 4426
5'2224  TS, 0744 4412 4432 4426  TS 2004 7777 7777 4424  TX 2020 4432 7777 4437 NA, 1354 4415 4475 4431
5'2230   TS 2004 7777 7777 4436 TS, 5144 4411 4432 7724     0014 0000 0000 0035  TS 2004 4432 4437 4442
5'2234  NA, 1354 4414 4475 4436  TS 2004 7777 7777 4441 TS, 5144 4410 4437 7724     0014 0000 0000 0035
5'2240   TS 2004 7777 7777 4442  TS 2004 4416 4437 4442 EBA 3413 0010 4416 4400 EBA 3113 4473 4416 0010
5'2244   TX 2120 4437 7777 0150 EBA 3413 0010 4416 4473  TX 2520 0011 7777 0010 EBA 3113 4472 4416 0011
5'2250   TS 2004 7777 7777 7542 DA, 5441 4435 5766 3707  EX 0216 4402 1470 4721  EOI5240 0356 7351 3524
5'2254   EOI5240 0356 7351 3524  EOI5240 0356 7351 3524  EOI5240 0356 7351 3524  EOI5240 0356 7351 3524

        PRECEDING LINE IS REPEATED, UNTIL:

5'2270   EOI5240 0356 7351 3524     0000 5123 0010 0000     0000 0000 4012 7700     0000 0000 4012 6140
5'2274      0000 0000 4012 7776     0000 0000 4010 0000     0000 0000 4013 1164     0300 7777 7777 7777
5'2300      0000 0000 4011 0000     0000 0000 0000 0000  SS 0006 7547 0000 0100 EBA 3413 0012 4051 4052
5'2304  EBA 3413 0015 4051 4054  TX 2120 4077 7777 0012  TS 2204 4055 0015 5003     0077 0000 0000 0000
5'2310      0000 7700 0000 0000     0000 0000 7700 0000     0000 0000 0077 0000     0000 0000 0007 7777
5'2314      0000 7777 0000 0000     0000 0000 7777 0000     0000 0000 0000 7777     7777 7777 0000 0000
5'2320      0000 0000 0017 7777     0007 0000 0000 0000     0000 0000 0000 0007     0000 0000 0000 0077
5'2324      0000 0000 0077 7770     0000 0000 0077 7777     1717 1717 1717 3717 EBA 3113 4073 4051 0015
5'2330   TN 1120 4060 0200 0255 EBA 3413 0015 4051 4073 EBA 3113 4054 4051 0015 EBA 3113 4053 4051 0013
5'2334  EBA 3113 4052 4051 0012  TS 2004 7777 7777 7542 SWS 2006 4062 0407 4060 SWS 2006 4062 0610 4060
5'2340  SWS 2006 4062 1611 4060 SWS 2006 4062 2012 4060 SWS 2006 4062 3023 4060 SWE 2016 4060 0026 4060
5'2344  SWE 2016 4062 3016 5075 SWE 2016 4062 1414 5076  DM 0003 5076 4070 5076  DA 2001 5076 5075 4061
5'2350   TS 2004 7777 7777 5030     0000 0000 0000 0000     0000 0000 4003 4121     0000 0000 4002 4000
5'2354      0000 0000 4002 1645     0000 0000 0013 0000     0043 0000 0000 0000 TS, 0044 0000 0000 0000
5'2360  FBA 1501 0114 0501 3304     0000 0000 0007 0424     0021 2424 0000 0004     0000 0000 0010 0000
5'2364      0000 0000 0000 0074     0000 0000 0000 0005     0000 0000 0000 0006     0000 0001 0000 0000
5'2370      7400 0140 0000 0000     0000 5022 4013 1405     0000 0000 4011 0100     0000 0000 4011 0102
5'2374      0000 0000 4012 4102     0000 0000 4013 1435     0000 0000 4013 1164     0300 7777 7772 6400
5'2400  MPC 2600 0000 1401 7734     7777 7777 7777 7777     0000 0000 0000 0101  TS 2404 6435 4062 7777
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5'2404     SWE 2416 6435 0322 5060 SWE 2016 4062 0013 4062 SWS 2006 4062 5524 5060  TX 2020 4062 7777 5061
5'2410     EBA 3413 0013 4051 4053  WA 2015 7561 4062 4062 LA, 2574 4062 4064 5016  WD 2035 4062 4064 4062
5'2414      DA 2201 4062 0442 4062      0000 0020 0000 0000 LA, 2574 4062 4065 4036  WD 2035 4062 4066 4062
5'2420     DA, 1441 4062 4067 4062 LA, 1474 4062 5057 5012 DA, 1741 4062 5056 4062 LA, 0774 4062 4056 5012
5'2424     DS, 1761 4062 4057 4062  TS 6404 0102 7777 7535      0000 0205 0002 0000  TS 2004 5027 5025 5016
5'2430     NA, 2154 7723 4051 5050  TX 2020 4062 7777 7561  TS 2404 6435 5076 7777  TX 2120 4063 7777 6435
5'2434     WD, 1375 5076 5061 5076 LA, 1374 5076 4051 5037 WA, 2255 7561 5002 7561  TX 2120 7534 7777 0015
5'2440      WA 2115 6406 5062 0013 SWE 2116 6442 2020 0015 LA, 2574 4025 6400 5050  TS 6004 7777 7777 5051
5'2444      TS 6604 0113 0015 5051  TS 6604 0113 0015 5051  TS 6604 0113 0015 5051  TS 6604 0013 0015 5051
5'2450      TS 2004 7561 7560 4027 LA, 6574 4025 6400 5055 LA, 6574 5060 6400 5054 TS, 6544 4051 6400 5055
5'2454     WD, 6575 6400 5060 6400  TX 2020 5075 7777 5075      0000 2000 0000 0000      0000 2631 0000 0000
5'2460         0000 0000 0002 5750      0000 0000 0000 2575      0000 0000 0000 0046 BS, 0171 0117 5733 4372
5'2464         4700 2216 4420 7777 EOI5240 0356 7351 3524 EOI5240 0356 7351 3524 EOI5240 0356 7351 3524
5'2470      EOI5240 0356 7351 3524 EOI5240 0356 7351 3524 EOI5240 0356 7351 3524 EOI5240 0356 7351 3524
5'2474      EOI5240 0356 7351 3524      0000 0000 0000 2424      0000 0000 0010 0000      0300 7654 6017 7777
5'2500         0000 0000 4013 4000      0000 0000 0000 0000  SS 0006 7551 0000 0200  TS 2204 7534 0011 4013
5'2504         0000 0000 0000 0007      0000 0000 0000 0017      0000 0000 0003 4000      0000 0000 0000 7400
5'2510         0000 0000 0000 0077      0000 0000 0017 7777      4000 0000 0000 0000 SWS 2006 5734 3404 7722
5'2514      WA 2115 4441 4432 0000  NA 2614 0052 0140 4021 NA, 0454 7722 4433 4020 SWS 2006 7721 3604 7722
5'2520      LA 2434 0040 4431 4040  NA 2014 5001 4042 4025  TS 6404 0102 7777 7535      0000 0201 0001 0000
5'2524      TS 2004 7777 7777 7542  NA 2014 5001 4043 4027 PR* 0046 5000 0200 7777  TX 2120 4006 7777 0000
5'2530      NA 2414 0100 4432 4030 SWS 2106 4441 4011 0014 SWS 2106 4442 0011 0001 LA, 1274 4012 7721 4036
5'2534     TS, 1244 4012 7721 7777  TN 1520 0054 0600 0041  TX 2120 4431 7777 0054  WA 2015 4073 4432 4073
5'2540      WA 2015 4073 4432 4073  TS 2004 7777 7777 7542 MPC 2200 0003 1401 7734 MPC 2600 0001 1401 7734
5'2544         0000 0000 0000 0004      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000
5'2550         0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0000

           PRECEDING LINE IS REPEATED, UNTIL:

5'2570         0000 0000 0000 0000      0000 1162 4012 4612      0000 0000 4013 0527      0000 0000 4013 0531
5'2574         0000 0000 4012 4102      0000 0000 0010 0000      0000 0000 4013 0540      0300 7777 7777 7777
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5'2600      MPC 2600 0000 1401 7734      7777 7777 7777 7777      0000 0000 0000 0113 SWS 2106 4431 0010 0041
5'2604       TS 2204 4075 0011 7542 SWE 2116 4071 0004 0000  WA 2515 0000 4406 0000 SWE 2516 0040 2004 0005
5'2610       WA 2515 0005 4406 0000  LA 2434 0005 4431 6007  WA 2715 0040 0142 0001      0000 0000 0000 0011
5'2614      SWS 2106 4406 0007 0001  TX 2420 1541 7777 4050  TS 2404 0041 4051 4026  WA 6215 4056 0143 4056
5'2620          0000 0000 0000 2000 SWS 6006 4052 0111 4052  EX 4016 4050 4052 4054  SS 4006 4431 4052 4050
5'2624       EX 4016 4053 4052 4055  NA 6014 4054 4055 6017  TX 2020 7777 7777 7777  BM 0713 1525 1303 0041
5'2630      TS, 7144 0474 5504 6342  EOI5240 0356 7351 3524  EOI5240 0356 7351 3524  EOI5240 0356 7351 3524
5'2634       EOI5240 0356 7351 3524  EOI5240 0356 7351 3524  EOI5240 0356 7351 3524  EOI5240 0356 7351 3524

            PRECEDING LINE IS REPEATED, UNTIL:

5'2674       EOI5240 0356 7351 3524  EOI5240 0356 7351 3524  EOI5240 0356 7351 3524      0300 7657 4017 7777
5'2700      MPC 2600 0000 1401 7734      0000 0000 0000 0000      0000 0000 0000 0000      2163 2043 2000 0001
5'2704          0000 0000 0400 0000      0000 0000 0200 0000      0000 0000 0013 5450      2163 2043 2000 0001
5'2710          0000 0000 0001 1432      0000 0000 0000 0000  TX 2420 0056 7777 6003  TX 2520 0004 7777 0002
5'2714      TS, 1344 4423 4073 6016 SWS 2006 4423 4013 4073  TX 2120 6006 7777 0015  TX 2120 4053 7777 0014
5'2720       TS 2204 4052 0011 7542  WD 6135 4427 4004 0016 NA, 5154 7001 6007 6027 NA, 4654 7001 6007 6027
5'2724      NA, 5054 7001 6007 6027  LA 6434 0016 4427 6031  TS 6004 7001 6010 6032  NA 6414 0156 4051 6022
5'2730       WD 2535 0016 4004 0016  TX 2420 0116 7777 7777  TX 6420 0056 7777 7001  TX 2120 6010 7777 0056
5'2734       LA 2034 4011 6003 6015  TX 2120 4427 7777 0016 NA, 1154 7000 6003 6041 NA, 1054 7000 4051 4060
5'2740      NA, 0654 7000 5400 6012  NA 2414 0156 4051 6036  TX 2020 4011 7777 4525 NA, 0654 6003 5000 6051
5'2744      TS, 1344 6003 6403 6437  TS 6004 6003 6007 6021  TS 2004 7000 4525 6050  LA 2434 0056 4051 6014
5'2750       TS 2204 7001 0156 6047  TS 2204 4427 0016 6053  LA 2434 0156 4051 6414 NA, 0654 7000 5000 6052
5'2754      TX, 1160 4051 7777 4501  TX 2020 4013 7777 6403  TX 2120 4427 7777 0016  LA 2434 0056 4051 6404
5'2760      NA, 0654 7000 5000 6070 NA, 1054 7000 4051 6063 TS, 1644 4016 4501 6070 NA, 0754 7000 4051 6067
5'2764      LA, 1374 6403 7000 6070  SS 0006 4521 4521 4501 TS, 1344 7000 6403 6070 LA, 1374 5010 7000 6071
5'2770       TS 2404 0116 7777 6057 TS, 1544 4015 4501 6070      0000 0000 0000 0000      0000 0000 0000 0000
5'2774          0000 0000 0000 0000      0000 0000 0000 0000      0402 2336 5155 1355      0300 7655 4012 7000
5'3000      MPC 2600 0000 1401 7734      0000 0000 0000 0000      0000 0000 0000 0000      0000 0000 0000 0001
5'3004      LA, 1174 4501 4051 6415  EX 0216 4501 0142 6007      7077 0000 0000 0000  NA 2014 6007 4521 6411
5'3010       TS 2404 0102 7777 6437 TS, 1344 5010 6403 6410 SWS 2006 4423 2013 4073  TS 2004 7777 7777 6016
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